Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of		
Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers	)	WC Docket No. 03-173

DECLARATION OF ROBERT D. WILLIG
ON BEHALF OF AT&T CORP.

December 16, 2003

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DECLARATION OF ROBERT WILLIG

I. QUALIFICATIONS.

1. I am Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University, a position I have held since 1978. Before that, I was Supervisor in the Economics Research Department of Bell Laboratories. My teaching and research have specialized in the fields of industrial organization, government-business relations, and welfare theory.

2. I served as Deputy Assistant Attorney General of Economics in the Antitrust Division of the Department of Justice from 1989 to 1991. I am the author of *Welfare Analysis of Policies Affecting Prices and Products*; *Contestable Markets and the Theory of Industry Structure* (with W. Baumol and J. Panzar), and numerous articles, including "Merger Analysis, IO theory, and Merger Guidelines." I am also a co-editor of *The Handbook of Industrial Organization*, and I have served on the editorial boards of the *American Economic Review*, the *Journal of Industrial Economics* and the MIT Press Series on regulation. I am an elected Fellow of the Econometric Society and an associate of The Center for International Studies.

3. I have been active in both theoretical and applied analysis of telecommunications issues. Since leaving Bell Laboratories, I have been a consultant to AT&T, Bell Atlantic, Telstra and New Zealand Telecom, and have testified before the U.S. Congress, this Commission, and the public utility commissions of about a dozen states. I have been on government and privately-supported missions involving telecommunications throughout South America, Canada, Europe, and Asia. I have written and testified on such subjects within telecommunications as the scope of competition, end-user service pricing and costing, unbundled access arrangements and pricing, the design of regulation and methodologies for assessing what activities should be subject to regulation, directory services, bypass arrangements, and network externalities and universal service. On other issues, I have worked as a consultant with the FTC, the Organization for Economic Cooperation and Development, the Inter-American Development Bank, the World Bank and various private clients. I also served on the Defense Science Board task force on the antitrust aspects of defense industry consolidation and on the Governor of New Jersey's task force on the market pricing of electricity.

II. INTRODUCTION AND SUMMARY OF CONCLUSIONS.

4. I have been asked by AT&T Corp. ("AT&T") to provide testimony that responds to the economic and regulatory policy issues raised by the *Notice*.[1] In the *Notice*, the Commission asks what changes, if any, it should make to the rules adopted in the 1996 *Local Competition Order*[2] governing the prices that incumbent local telephone carriers can charge new entrant competitive carriers for "unbundled" access to the incumbents' local networks. As I explain in greater detail below, although I believe that developments since 1996 may require

[1] Notice of Proposed Rulemaking, WC Docket No. 03-173 (rel. Sep. 15, 2003) ("*Notice*").

[2] First Report and Order, 11 FCC Rcd. 15499 (1996) ("*Local Competition Order*").

refinement of the articulation of the "TELRIC" pricing standard, the core of that methodology should be retained.

5. The basic economic principles that should govern the pricing of unbundled network elements recognized by the Commission in 1996 remain equally valid today. The underlying purpose of the sections 251 and 252 of the Communications Act of 1996 is to promote local exchange competition and protect consumers, not to protect the margins of incumbent carriers nor to subsidize additional incumbent investment in local networks, regardless of whether such investment is efficient. Thus, in implementing the unbundling provisions of the Act, the Commission should seek to establish prices for telecommunications services that (i) steer purchasers to the most efficient, least-cost suppliers of each good or service for which there is sufficient demand; (ii) guide purchasers to make efficient choices among different goods and services offered in the market; and (iii) achieve the level of cost recovery that encourages efficient levels of investment, entry and exit.

6. In its *Local Competition Order*, the FCC correctly recognized that these goals are furthered by a regime in which the incumbents are permitted to charge rates for access to their local networks that best replicate, to the extent possible, the prices that would prevail in a competitive (or contestable) market for the services provided over those facilities. *See Local Competition Order* ¶ 679. And, as the Commission also correctly recognized in its *Local Competition Order*, in competitive and contestable markets, the bases for prices converge to long run, incremental costs ("LRIC"). *Id.* ¶¶ 677, 679, 699.[3] In an effectively competitive market, a

[3] Where a firm provides multiple services over a single network, there may be common costs that are not directly attributable to any specific service. In such a situation, compensatory rates must be in excess of long run incremental costs and also include a contribution to common costs. For ease of exposition, when I discuss rates as "converging to" or being "based on" LRIC, I also (continued . . .)

firm cannot expect to recover more than the full economic cost of its operations. Forward-looking, economic costs provide the basis for competitive prices, define the thresholds for cross-subsidization, and govern expansion, contraction, replacement, entry and exit decisions in competitive markets.

7. Pricing the services of assets in accordance with their valuations at their forward-looking, economic costs also helps to ensure that they are used efficiently and are not wastefully discarded even if they remain productive. An old piece of equipment that still has some useful life would be wastefully abandoned if it were placed on the market at a price corresponding to its high embedded cost, or if it were required to return revenues based on that embedded valuation. Adjustment of the valuation of this equipment to its forward-looking cost ensures its continued productive use.

8. By contrast, permitting recovery of embedded costs (or the current costs of reproducing the embedded network design) in network element rates would protect and spread the impacts of existing inefficiencies, and provide misincentives for creation and preservation of inefficiencies. Indeed, basing the prices of network elements on embedded costs or embedded design would fundamentally undermine the pro-competitive purposes of the Act. Accounting costs as carried on the books of an incumbent will reflect any existing inefficiencies in the network. Furthermore, these accounting costs may reflect the incentives that the incumbents have had to shift costs to their regulated operations. Extant networks likewise may embody construction and design practices that evolved in a world where competitive and regulatory pressures to be efficient were inadequate. As the Supreme Court recognized, "[i]f leased

(. . . continued)
include a contribution to common costs.

elements were priced according to embedded costs, the incumbents could pass these inefficiencies to competitors in need of their wholesale elements, and to that extent defeat the competitive purpose of forcing efficient choices on all carriers whether incumbents or entrants. The upshot would be higher retail prices consumers would have to pay." *Verizon Communications Inc.* v. *FCC*, 535 U.S. 467, 512 (2002). Thus, "[a] lease rate that compensates the lessor for some degree of existing inefficiency (at least from the perspective of the long run) is simply a higher rate, and the difference between such a higher rate and the TELRIC rate could be the difference that keeps a potential competitor from entering the market." *Id.* at 509.

9. Nonetheless, the *Notice* asks for comment as to whether its TELRIC rules are theoretically flawed. Citing to criticisms that have been advanced by the incumbents in state commission proceedings, the *Notice* asks whether its TELRIC rules assume a greater level of efficiency that can be achieved in the "real world" and, as a result, do not allow incumbents the same opportunity to recover costs as firms have in competitive markets. As I describe below, these criticisms are based on a fundamental misunderstanding of how assets are valued in competitive markets.

10. Changes to TELRIC are not necessary to "incent" investment in local network facilities by either incumbent or competitive carriers. This should be clear both as a matter of economic logic and as a matter of fact. *See infra* Part III.B. The proper goal of UNE pricing is not to encourage facilities-based investment regardless of cost, but to encourage facilities-based investment only when it is the most efficient alternative. TELRIC pricing of UNEs helps to attain satisfaction of this goal. Competitive carriers have strong reasons to invest in their own facilities – even when incumbent facilities can be leased somewhat more cheaply – because

competitive carriers are understandably reluctant to be dependent upon a supplier of critical inputs that has no incentive to supply those inputs in a commercially reasonable manner. Further, UNEs can serve as a "bridge" that allows competitive carriers partially to overcome the sunk cost entry barriers into local telephone markets. UNEs can allow a new entrant to build a customer base and then transition that base to its own facilities once it is economic to do so. *USTA* v. *FCC*, 290 F.3d 415, 424 (2002) ("[A]ccess to UNEs may enable a CLEC to enter the market gradually, building a customer base up to the level where its own investment would be profitable.").

11. At the same time, incumbent investment incentives are not materially weakened by unbundling. UNE rates set appropriately under the TELRIC principles ensure that incumbents have adequate incentive to invest in new facilities because such rates include forward-looking, risk adjusted costs of capital and depreciation lives – a point that the Supreme Court has expressly recognized. *See Verizon*, 525 U.S. at 519 ("TELRIC itself prescribes not fixed percentage rate as risk-adjusted capital costs and recognizes no particular useful life as a basis for calculating depreciation costs" and, therefore, may be "adjusted upward if the incumbents demonstrate the need"); *id.* at 520 ("TELRIC rates leave plenty of room for differences in the appropriate depreciation rates and risk-adjusted capital costs depending on the nature and technology of the specific element to be priced."). Competition fostered by the unbundling requirements of the Act also gives incumbents added incentive to improve their networks in order to avoid losing customers to new entrants. *Id.* at 517 n.33 (it is "commonsense . . . that so long as TELRIC brings about some competition, the incumbents will continue to have incentives to invest and improve their services to hold on to their existing customer base").

12. This "commonsense" is confirmed by hard econometric evidence. Using both reduced form and structural econometric relationships, I have shown that there is no factual support for the claim that relatively low UNE prices stifle incumbent investment. The econometric results also provide support for the contrary conclusion – *i.e.*, that easing competitive entry with relatively low UNE prices actually *encourages* incumbent investment. Specifically, I estimate that a 1% *reduction* in UNE rates is associated with a 2.1% to 2.9% *increase* in incumbent investment. The evidence shows that the unbundling of incumbent networks promotes competition, and thereby stimulates investment in telecommunications infrastructure by incumbents and entrants alike.

13. There are serious flaws in the proposed "modifications" to TELRIC suggested by the *Notice* to make it reflect more closely the "actual" or "real-world" costs of ILECs. *See infra* Part IV. Before responding to the specifics of these proposals, however, it is first necessary to clarify the meanings of the terms used to label and describe the proposed concepts. In their seven-year campaign against the *Local Competition Order*, the incumbents and their witnesses have used terms like "actual costs" and "real-world costs" as labels for these several different (and largely inconsistent) concepts:

- embedded costs;
- reproduction costs;
- short-run incremental costs; and
- cost models that reflect actual topography, customer locations and network routes more precisely than did the first generation of cost models.

To most economists, however, the term "actual cost" generally connotes the concept of forward-looking economic cost – the very concept that the incumbents most oppose. In order for the Commission to resolve the economic and policy issues raised by these proposals, it is necessary

for each proposal to be specifically defined and analyzed, and it is necessary that the discourse proceed beyond reliance on the semantics of the terms "actual cost" and "real-world costs."

14. *Embedded cost proposals.* Many of the changes sought by the incumbents, and proposed for comment in the *Notice*, would require that the costs of a UNE be calculated to reflect the existing network design and practices of the incumbent. *See infra* Part IV.A. But, for the precise reasons stated by the Commission in the *Local Competition Order*, this "is essentially an embedded cost methodology" that would allow incumbents to recover costs associated with "inefficient or obsolete network design and technology." *Local Competition Order* ¶ 684. The incumbents have suggested that the magnitude of the difference between "actual" costs and efficient costs can be expected to be small due to the efficiency of their investments and operations, stemming from the incentives for efficiency under price cap regulation. This suggestion provides no rationale for neglecting to base pricing on forward-looking economic costs, especially since economic theory demonstrates that price cap regulation will not induce incumbents to achieve the same level of efficiency as effective competition.

15. *Reproduction-plus cost proposals.* Also flawed is the incumbents' "actual forward-looking" pricing standard. *See infra* Part IV.B. This standard should not be confused with a pricing standard based on short run incremental cost. It is textbook economics that short run incremental cost is the efficient level of forward-looking expenditure for production during the time period over which efficient decisions are influenced by the extant assets from the firm's previously expended sunk costs. Invoking the logic of the short run, the incumbents argue that the costs of piecemeal upgrades of existing network capacity should be efficient because existing capacity is sunk; hence, installing a piecemeal upgrade is cheaper than deploying new capacity sufficient to serve all existing demand. But the short-run time horizon has a second, equally

important, implication that the incumbents' arguments ignore: inasmuch as most of their investments are sunk, the short- or intermediate-run incremental costs of incumbents providing UNEs are likely quite low, since these forward-looking costs do not include the sunk costs. The opportunity cost of continuing to use sunk investment is zero, since the sunk costs of these assets are irreversible and would not be diminished or enlarged depending on whether the assets are utilized over their remaining lives. The incumbents, however, ask the Commission to allow them to price on the basis of the sum of both the full reproduction cost of the sunk facilities *and* the higher unit costs of the upgrade. No efficient firm would ever incur this combination of costs "in the real world" – in either the long run *or the short run*. It would be less costly for a firm to jettison its sunk assets and to start afresh than to pay the sum of both the full replacement cost of the sunk facilities *and* the higher unit costs of the upgrade.

16. *Proposals to refine TELRIC cost models to reflect more precisely topography, customer locations, or cable routes.* The Commission's proposal to refine the existing cost models to reflect more precisely such cost determinants as (1) rivers, mountains and other topographical features; (2) customer locations; (3) existing highways and other right-of-way corridors for cables stands on a different footing; (4) sharing opportunities; and (5) network optimization. *See infra* Part IV.C. As a preliminary matter, I understand that current TELRIC models already reflect a substantial amount of topographical and other detail. *See, generally, e.g.,* Bryant Essay; Klick Decl. In any event, more detail in principle is better, all other things (including the transaction costs of collecting and modeling the data) being equal. Several caveats should be noted, however. First, the level of physical detail reflected in a cost model is a separate issue from the choice between forward-looking and embedded cost, and from the choice of the time horizon for determining forward-looking costs. Incorporating relevant

geographic and demographic features into cost models requires neither the assumption of existing network design, nor the valuation of network assets at their historic cost levels, or at their short run costs. Second, the Commission should not require (or give preference to) greater detail and specificity in cost modeling without first taking steps to counter the impacts of the information asymmetry that favors the incumbents. "Actual" forward-looking cost models are no more transparent, verifiable or practical to administer than existing TELRIC models. To the contrary, much of the information needed to achieve greater specificity in modeling is in the sole possession of the incumbents. Unless and until the Commission requires the incumbents to share the relevant databases with competitive carriers and other litigants, resolution of this issue is premature. Third, and most important, there is no reason to believe that greater specificity in network modeling would lead to higher calculated costs and prices. Indeed, the evidence is that existing TELRIC models use very conservative algorithms, and produce *higher* estimates of the amount of needed outside plant than do models that try to map actual customer locations, topography, terrain and cable rights-of-way with greater geographic realism.

17. I recognize, of course, that the calculated levels of the network element rates are often driven by the "inputs" to the cost studies that are employed to estimate forward-looking costs. Indeed, I understand that despite the incumbents' steadfast opposition to basic principles of economic cost pricing, the cost studies that they have advocated would not produce rates substantially different from those presented by competitive carriers if comparable input values were employed. However, the issues of what are the appropriate input values cannot be divorced from the fundamental question of what is the overall conceptual standard relied upon to set UNE rates. Thus, I apply basic long run, incremental pricing principles to the choices of many of the key input values at issue in state commission UNE proceedings. *See infra* Part V.

III. THE CONCEPTUAL ATTACKS ON LRIC-BASED UNE RATES ARE MISPLACED.

18. As described above, the Commission in its *Local Competition Order* concluded that UNEs should be priced on the basis of LRIC. In *Verizon*, the Supreme Court expressly rejected challenges to that decision, finding that the Commission's analysis was well reasoned and supported by substantial evidence. Despite these rulings, the Commission in the *Notice* asks whether it should reverse its prior general endorsement of LRIC based UNE rates in general or the specific TELRIC rules it adopted to implement that standard. In particular, the *Notice* seeks comment on conceptual criticisms of TELRIC. First, the Commission asks whether its TELRIC rules do not allow incumbent firms the same opportunity to recover their costs as a firm in an effectively competitive or contestable market. Second, the Commission asks whether TELRIC-based UNE rates "sap" the incentives of incumbent and competitive carriers to invest in their own local facilities. As I describe below, both of these potential criticisms of TELRIC are misplaced.

A. Cost Recovery Arguments Against TELRIC Are Unfounded.

19. Before turning to the specific questions raised in the *Notice* regarding conceptual criticisms of its TELRIC rules, it is important to emphasize that no one seriously disputes that LRIC is the appropriate benchmark for the prices that would obtain in a competitive (or contestable) market. *See, e.g.,* Arrow, et al. Essay at 14-15 (describing TELRIC without disputing that LRIC is the appropriate benchmark for prices). The measure of costs to which efficient prices converge in competitive and contestable markets is long run, incremental costs. *Accord Local Competition Order* ¶¶ 677, 679. In competitive and contestable markets, firms can charge rates only up to those based on the outlays that would be entailed if the technology employed were the most efficient currently available, regardless of the level of embedded cost.

In an effectively competitive or contestable market, an entrant can select the mix of assets that provides service in the most efficient manner going forward, and this threat of potential entry prevents the incumbent supplier from recouping any excess in costs imposed by imperfect efficiency of its existing operations.

20. Of course, LRIC-based pricing does not require that rates reflect any prospects of even lower levels of cost than can reasonably be expected to be achieved via future productivity improvements. Rather, appropriate LRIC-based rates can incorporate only current efficient costs.

21. In addition, appropriately calculated LRIC-based UNE rates compensate incumbents for *all* the *ex ante* risks that they assume in deploying facilities – as the Supreme Court expressly recognized. As noted, the LRIC standard is no more or less compensatory than are the prices that competition allows firms to collect in effectively competitive or contestable markets. *See Verizon*, 535 U.S. at 519 ("TELRIC itself prescribes no fixed percentage rate as risk-adjusted capital costs and recognizes no particular useful life as a basis for calculating depreciation costs" and, therefore, may be "adjusted upward if the incumbents demonstrate the need"). Further, because "TELRIC rates are calculated on the basis of individual elements," "TELRIC rates leave plenty of room for differences in the appropriate depreciation rates and risk-adjusted capital costs depending on the nature and technology of the specific element to be priced." *Id.* at 520.

22. As noted, although the *Notice* does not question the appropriateness of LRIC-based UNE rates in general, it nonetheless seeks comment on arguments that have been advanced by the incumbents that the specific TELRIC rules promulgated by the Commission to implement LRIC are flawed. *First*, the *Notice* suggests that its existing "TELRIC" rules are in

"internal tension[]" because they (1) "assum[e]" that the incumbent faces "multiple competitors" that drive rates to costs, yet (2) base rates on the assumption that service is provided by a "single carrier" that operates "an efficient network [that is capable of] serv[ing] all customer locations within a particular geographic area." *Id.* The tension posited by the *Notice* is illusory.

23. The basic flaw in the *Notice*'s reasoning is that it equates the competitive market framework for application of LRIC pricing with the requirement that there be multiple, facilities-based competitors. Although it is, of course, correct that a market with numerous, vigorous firms will ordinarily be competitive, the existence of multiple competitors in a market is not a *necessary* condition for that outcome. Markets will also achieve competitive results when effectively *contestable.* The contestable market standard "offers a generalization of the notion of purely competitive markets, a *generalization* in which fewer assumptions need to be made to obtain the usual efficiency results. Using contestability theory, economists no longer need to assume that efficient outcomes occur only when there are large numbers of actively producing firms. What drives contestability is the possibility of costlessly reversible entry." William J. Baumol, John C. Panzar and Robert D. Willig, *Contestable Markets And the Theory of Industry Structure* xiii (rev. ed. 1988) (emphasis added); *see also generally* William Baumol, *Contestable Markets: An Uprising in the Theory of Industry Structure*, The American Econ. Review (March 1982); *Coal Rate Guidelines—Nationwide*, 1 I.C.C.2d 520, 528-29 (1985), *aff'd*, *Consolidated Rail Corp. v. United States*, 812 F.2d 1444 (3rd Cir. 1987); *Minnesota § 271 Approval*, ¶ 60 (facilities-based entry not necessary for § 271 approval because UNE-based competition is sufficient); *New Mexico, Oregon and South Dakota § 271 Approval*, ¶ 13 (same); *Nevada § 271 Approval*, ¶ 14 (same).

24. In this context, the Commission should apply LRIC in order to replicate, to the extent possible, a contestable market – as opposed to a traditional "competitive" market. Seeking to replicate the workings of a market characterized by multiple competitors is inappropriate for the pricing of UNEs because the network elements at issue here are produced by facilities with large sunk fixed costs and enormous scale and scope economies, and, therefore, long run incremental costs are well above marginal costs.[4] It is widely recognized that competition in such conditions can be "wasteful." *See, e.g.*, Sidney Shapiro & Joseph Tomain, REGULATORY LAW AND POLICY 189-92 (1993). As Professor Kahn put it, "[w]hen the entire demand can most efficiently be supplied via a single set of telephone poles . . . it becomes inefficient to duplicate them and to have two companies digging up the streets at various times instead of one." Alfred Kahn, II THE ECONOMICS OF REGULATION 121-22 (1970). Thus, the assumption of multiple facilities-based competitors – *i.e.*, a pure "competitive market" benchmark – would imply extremely low UNE rates that would not remotely compensate the provider for the cost of the facilities used to provide the UNEs.[5]

[4] The multiple facilities-based competitor standard might be appropriate if the goal were to price UNEs that the Commission believed could be duplicated by competitive carriers in the near term. However, in the *Triennial Review Order*, Report and Order and Order of Remand and Further Notice of Proposed Rulemaking, FCC 03-36 (rel. Aug. 21, 2003), the Commission has eliminated access to network elements in those instances where the Commission believes that alternative facilities can economically be deployed by competitive carriers – *i.e.*, where competitive carriers can earn revenues sufficient to cover their (largely) sunk investment plus operational costs. Accordingly, the goal for the Commission in this proceeding is to develop pricing rules for those parts of the incumbent network for which alternative facilities are unlikely to be deployed for the foreseeable future.

[5] In this regard, as I explain in greater detail below, it is the incumbents' arguments on the recovery of capital costs that are internally inconsistent. The incumbents have argued that return on capital and depreciation lives should reflect the risks associated with "multiple, facilities-based competitors." *Accord, Triennial Review Order* ¶ 680. Yet at the same time, they have maintained that they should recover their "actual" forward-looking costs. As explained above, if the goal of UNE pricing were to replicate the prices that would replicate the workings of a (continued . . .)

25. On the other hand, a contestable market framework avoids these problems because it fits well with the economic reality of the markets at issue. For markets characterized by large sunk fixed costs and enormous scale and scope economies, the framework for setting prices that allows the incumbent to recover fully the efficient, economic costs of the services it provides but also eliminates supracompetitive prices, is contestable markets. Here, this framework assumes a single incumbent firm that serves the entirety of demand but that faces the potential of instantaneous and frictionless entry by a potential competitor employing the most efficient technology. *See Coal Rate Guidelines*, 1 I.C.C.2d at 528. In such a contestable market, the incumbent would not be able to charge rates in excess of LRIC for any service or it would risk displacement by a potential entrant. *Id.* But at the same time, the incumbent would be able to set prices at LRIC without attracting entry and thereby recover its efficiently incurred costs.[6]

26. *Second*, the *Notice* suggests that its TELRIC rules – which require that UNE rates be based on "the most efficient telecommunications technology currently available and the lowest cost network configuration," 47 C.F.R. § 51.505 – may be inappropriate because in the "real world . . . firms do not instantaneously replace all of their facilities with every improvement in technology." *Notice* ¶ 67. These statements do not reflect understanding of the effect of technological advances on asset values in competitive markets, and how changes in economic costs (even if not reflected in immediate changes in accounting costs) inform competitive behavior.

(. . . continued)
market with vigorous, multiple competitors, the resulting prices would converge not to the incumbents' "actual forward-looking" costs, but to their much lower marginal costs.

[6] Demand for calculating TELRIC has always been the quantity of demand served by the ILEC, not the entire market.

27. LRIC-based pricing does not assume that at any given time the entire network is being "ripped out" and replaced by the most efficient technology available. Existing assets may remain in service, in competitive and noncompetitive markets alike, long after ceasing to be state-of-the-art. This phenomenon occurs because it is *less expensive*, overall, than the replacement-of-all-assets assumption that is the *sine qua non* of a true LRIC cost study. In competitive and contestable markets, however, to the extent that state-of-the-art assets provide better or cheaper service than earlier vintages of assets, the economic *values* of the older assets are adjusted downward almost immediately to offset the greater productivity or lower cost of the more advanced technology.

28. For these reasons, even while a firm may "in the real world" have a mix of "old" and "new" assets, the economic value of the mix is not based on what the firm paid for those assets, but how productive those assets are in light of the assets available to its active and potential competitors. Stated another way, firms that operate in such markets must price their products and services as if their other production technologies operated most efficiently, whether or not they actually do. Accordingly, LRIC based pricing does not imply instantaneous entry or network reconfiguration will literally occur, but seeks to replicate the *performance* of markets that are disciplined by the threat of such entry – *i.e.*, markets that are fully contestable.

29. The following example illustrates the correspondence of LRIC to competitive pricing and makes clear the *Notice*'s mistaken premise.

> Suppose a firm has recently acquired a machine for $100, but before the machine has been installed, technical progress enhances machine design and so makes available a substitute machine with equal expected life and production capacity, but at a price of $75.[7] If the firm decides to resell its

[7] Many of us have had just such an experience in purchasing personal computers. Between the (continued . . .)

> newly acquired and unused machine, will any buyer in a free competitive market be willing to pay the original price of $100 and enable the firm to recoup its previous outlay?[8] It is obvious that with a perfect substitute available for $75, no buyer will be prepared to pay the original price.[9] But not only will a competitive market preclude recovery of the currently excessive original cost of the machine via resale; it also will not permit the firm to recover the original cost of the machine through the prices of the final products it is used to provide. This is because the availability of the newer and more efficient machine will enable competitors to provide the final product at prices that cover *only* the costs of this currently available, most efficient equipment.

Baumol Essay at 6-7.

30. As this example illustrates, the only relevant *economic* capital costs are the forward-looking costs of such equipment – and competitive markets permit full recovery of these costs, just as TELRIC does. Competitive forces cannot make any allowance for historical costs because no current rival will abstain from competing via a final-product price that covers only the forward-looking costs of its investment. In competitive markets, embedded cost is patently a piece of irrelevant past history. And since competitive market prices are those that are required for economic efficiency, the public interest makes it incumbent upon the Commission to require prices to be completely independent of embedded cost and to be based instead on the costs of efficient operation.

(. . . continued)
time that the order is placed and we receive delivery, the price of similar machines has dropped.

[8] For expository convenience, it is assumed here that there are no additional removal and installation costs incurred if the machine is redeployed.

[9] Indeed, if the substitute machine is also more efficient than the old machine, the market price of the old machine may well be below $75.

31. In sum, the fact that firms in the "real world" may have different vintages of physical capital does not mean that the embedded or reproduction costs of these past investments are relevant for the forward-looking calculations of economic costs of the unbundled elements.

B. Investment Incentive Arguments Against LRIC Are Also Unfounded.

32. The *Notice* also asks whether LRIC-based pricing is inappropriate due to concerns that such pricing may weaken the incentive of competitive or incumbent carriers to deploy their own facilities. *Notice* ¶ 50. At the outset, I stress the obvious point that the relevant issues is the impact of UNE pricing rules on the incentives of carriers to make *efficient* investment in facilities. Investment that is socially wasteful – for example, the investment in a local network facility where the incumbent can serve demand at a much lower opportunity cost to society – should be discouraged, not encouraged, by the Commission's pricing rules.

33. The concern cited by the *Notice* – that where UNEs are priced "below the costs that would actually be found even in extremely competitive markets," *Notice* ¶ 51 – is a straw man. Of course, all market economists would acknowledge that, if competitive carriers are given access to UNEs below the economic cost of providing those elements, this constitutes a subsidy of competitors and will induce over-reliance on UNEs and discourage the deployment of facilities even where they can be efficiently constructed. But the Commission's TELRIC rules require no such thing, and no one is proposing that incumbents be forced to provide UNEs at prices that lie below their economic costs.

34. Instead, the relevant policy issue before the Commission is whether UNEs priced on the basis of LRIC provide efficient investment incentives for incumbent and competitive carriers. The answer to that question is clearly yes. The availability of UNEs at LRIC-based rates quite plainly facilitates local telephone competition. And the increased competition

enabled by UNEs can be expected to result in lower retail prices both because of the efficiency improvements induced by competition and because of the pressure competition places on above-cost pricing. Lower prices will result in increased demand. The growing demand will induce additional facilities investment by incumbents and competitive carriers. Additionally, in a competitive environment, both the incumbent and the entrant will face enhanced incentives to improve quality and innovate with respect to services, leading to further investment. Indeed, there is now considerable evidence that the incumbents have uniformly responded to entry from competitive carriers with lower prices and new service offerings. *See, e.g.,* Joint Declaration of Stephen Huels *et al.* ¶¶ 66-78 (filed in the D.C. Cir. No. 03-3212, Sep. 24, 2003).

35. More specifically, the incumbents enjoy enormous advantages over new entrants as a result of their legacy as protected franchise monopolists that currently serve over 90% of existing demand. The incumbents benefit from large economies of scale and scope and enjoy important first mover advantages relative to competitive carriers with respect to rights of way and placement of outside plant and structure. The incumbents are also protected by sunk cost entry barriers – *i.e.*, entry by competitive carriers is very risky because many of the costs of local networks are fixed and sunk, and therefore cannot be recovered if the market price is driven down towards marginal cost by the competition between the entrant and the incumbent, or if the entering carrier ultimately is unable to remain viable in its competition with the incumbents.

36. When it is economically feasible, a competitive carrier would likely prefer to own its facilities so as to avoid having to be dependent on its largest competitor for essential inputs. But, because of the economic entry barriers discussed above, it is not economically practical for competitive entrants to replicate the incumbent's local network or, in many instances, even particular piece-parts of that network. UNEs, however, permit competitive carriers to share

incumbent scale and scope economies and to provide competition using shared facilities in those many instances where deploying alternative facilities is not economically feasible.

37. LRIC-based UNE prices provide the appropriate signals for the competitive carrier's build-lease decision. LRIC-based rates represent the economic cost of the facilities used to provide a UNE. Thus, where a competitive carrier can only deploy a facility at a cost higher than the LRIC of that facility, it is inefficient and socially wasteful for it to do so. In contrast, where a competitive carrier can secure services equivalent to those of a UNE at a cost at or below the UNE's LRIC, perhaps through synergies with its other activities, it is efficient for the competitive carrier to do so.

38. Further, UNEs can facilitate deployment of alternative facilities by CLECs in those limited instances where it is potentially economic to do so. For example, UNEs allow CLECs to grow sufficient scale in order to justify economic investment in their own facilities. As the Court of Appeals recognized in the *USTA* decision, UNEs can allow a new entrant to build a customer base and then transition that base to its own facilities once it is economic to do so. *USTA*, 290 F.3d at 424 ("[A]ccess to UNEs may enable a CLEC to enter the market gradually, building a customer base up to the level where its own investment would be profitable.").

39. In this regard, the incumbents' argument that raising the price of UNEs will result in more facilities-based investment by competitive carriers is bad economics. As I have explained in detail, Robert D. Willig, Determining "Impairment" Using The Horizontal Merger Guidelines (filed in CC Docket Nos. 01-338 *et al.*, Nov. 14, 2002), competitive carriers will not deploy their own local facilities when they face a significant cost-disadvantage vis-à-vis the incumbent. *See Triennial Review Order* ¶ 90. First, to obtain the revenues necessary to recover

the sunk costs of deploying local network facilities, the entrant must attract a sizeable base of paying customers. In the local telephony market, however, the incumbent carriers already have *in place* the networks necessary to serve *both* existing and future demand. Indeed, incumbent carriers provide telephone service to virtually all residences and businesses in the United States. Thus, to be viable, new entrant carriers must convince substantial numbers of existing customers to switch providers.

40. Second, a new entrant carrier must not only secure customers, but also must be able to charge those customers prices that are adequate to recover the costs of providing service. The presence of significant sunk costs makes the entrant vulnerable to pricing strategies by the incumbent and, as a result, "potential entry may not be effective in ensuring efficient pricing and product quality."[10] The reason for this is straightforward: the incumbent has already sunk its costs, while the potential entrant has not. In this situation, a potential entrant must fear that the incumbent will respond to its entry by pricing all the way down to its short run marginal costs. To the extent that the entrant would not be able to recover its costs at these lower prices, it will be deterred from entering. *Section 257 Report*, 12 FCC Rcd. 16802, ¶ 18 n.48 (1997). *See also MCI-BT Merger Order*, 12 FCC Rcd. 15,351, ¶ 162 (1997) (same).

41. This sunk cost entry barrier is particularly pronounced when there are also economies of scale or scope – as is the case for local loops, transport and switches. Where there are scale economies, to enter using its own facilities, a competitor must deploy facilities with sufficient scale to match the incumbent's scale economies; otherwise, it will be at a substantial cost disadvantage that makes effective competition impossible. But entry on such a massive

[10] *See also* Daniel Spulber, REGULATION AND MARKETS 603 (1989); *see also* Jean Tirole, THE THEORY OF INDUSTRIAL ORGANIZATION 314-23 (1988).

scale threatens to swamp the market with excess capacity. That, in turn, will make it more likely that all participants, including the entrant, will need to "price down" to a level that makes it impossible to recover their sunk investments. Again, potential entrants will understand these facts *ex ante* and would rationally choose not to build their own facilities in such a situation.

42. At the same time, the investment incentives of incumbents are not inefficiently weakened by unbundling at LRIC-based rates. The incumbents have adequate incentive to invest in new facilities where the rate for unbundled access fully reflects a forward-looking, risk adjusted cost of capital and depreciation lives – a point that the Supreme Court has expressly recognized. *See Verizon*, 525 U.S. at 519 ("TELRIC itself prescribes not fixed percentage rate as risk-adjusted capital costs and recognizes no particular useful life as a basis for calculating depreciation costs" and, therefore, may be "adjusted upward if the incumbents demonstrate the need"); *id.* at 520 ("TELRIC rates leave plenty of room for differences in the appropriate depreciation rates and risk-adjusted capital costs depending on the nature and technology of the specific element to be priced."). Competition fostered by the Telecommunications Act of 1996 ("the Act") also gives incumbents added incentive to improve their networks in order to avoid losing customers to new entrants. *Id.* at 517 n.33 (it is "commonsense . . . that so long as TELRIC brings about some competition, the incumbents will continue to have incentives to invest and improve their services to hold on to their existing customer base").

43. In the past, while the incumbents' economists have derided this line of argument as "vapid," Reply Decl. of Alfred Kahn and Timothy Tardiff, CC Docket No. 01-338, at 29 (dated July 14, 2002), they ultimately concede that it is correct. They acknowledge that "in its reply brief to the Supreme Court, the FCC described how, in principle, TELRIC can be sufficiently flexible to accommodate investment risks in a way that is approximately correct

economically." *Id.* at 29 n.52 (citing Reply Brief for Petitioner FCC in *Verizon Communications* v. *FCC*) (hereinafter "FCC *Verizon* Reply Br."). The incumbents' economists made the same concession in the original Local Competition Proceeding. FCC *Verizon* Reply Br. at 10-11 ("Indeed, in the FCC rulemaking that produced TELRIC, the incumbents acknowledged that an accurate calculation of economic depreciation and the costs of capital would obviate the problem that they allege here.") (citing statements). Thus, so long as LRIC-based rates "accommodate[] reasonable economic assumptions about future technological advances and the effects of those advances will have on the value of current assets" with respect to depreciation lives and provide for a "risk-adjusted cost of capital" that takes into account "existing competitive risks" but "also risks associated with the regulatory regime to which a firm is subject," FCC *Verizon* Reply Br. at 11, 12 & n.8, there can be no dispute that the incumbents are not adequately compensated.

44. Ultimately, there is no need to guess as to the impact of LRIC-based rates for UNEs on incumbent investment incentives. Along with several colleagues, I have conducted econometric studies that measure the cross-sectional variation in the terms and conditions upon which UNEs were available in the various states in order to test the linkage between the availability of UNEs, competitive LEC activity, and incumbent LEC activity. Robert D. Willig, *et al.*, Studying Investment and the Telecommunications Act of 1996 (filed in CC Docket Nos. 01-338 *et seq.*, Oct. 11, 2002). Employing standard econometric procedures, these studies were able to estimate how incumbent network investment was influenced by local competition, particularly local competition that resulted from UNE-P. Overall, this evidence shows a 1% reduction in UNE-P rates corresponds with approximately a 2.1% to 2.9% increase in incumbent LEC investment.

45. These commonsense results have been reinforced by recent work sponsored by the Phoenix Center. In a July 9, 2003 white paper, the Phoenix Center presented the results of a regression study that tests the relationship between RBOC net investment and the amount of UNE-P competition. Phoenix Center Policy Bulletin No. 5, Competition and Bell Company Investment in Telecommunications Plant: The Effects of UNE-P (Originally released 9 July 2003 and updated 17 September 2003).[11] According to the model, "each UNE-P access line increased BOC average investment by $759 per year, or about 6.4% per year in the aggregate." According to the paper, these results satisfy "traditional significance levels."

IV. THE ALTERNATIVES PROPOSED IN THE *NOTICE* ARE INFERIOR TO LRIC.

46. In addition to seeking comment on theoretical criticisms of LRIC-based pricing, the *Notice* also seeks comments on potential major changes to the Commission's existing TELRIC rules. At bottom, these proposals would use existing network design and practices as the basis for calculating incremental costs. As a result, they would require competitive carriers to pay for inefficiencies inherent in the incumbent networks and would, as the Commission previously recognized, be "pro-competitor – in this case the incumbent LEC – rather than pro-competition." *Local Competition Order* ¶ 50.

47. First, the *Notice* asks whether UNE rates should be set on the basis of "actual" or "real-world" costs. These terms, however, have no real content and have been used by the incumbents to mean a wide variety of potential cost standards. To the extent that *Notice* is suggesting that most extreme form of actual cost pricing – setting prices based on either book

[11] Available at <http://www.phoenix-center.org/>.

costs or existing network design – that is a non-starter. Although much has been made of the impact of "price cap" regulation, it has not closed the significant gap between embedded and forward-looking costs. *See infra* Part IV.A.

48. To the extent that what is meant by "actual" costs is "forward-looking, real world" or "actual, forward-looking" costs, that too would be an inappropriate basis for setting UNE rates. *See infra* Part IV.B. Although the incumbents have never exactly spelled out exactly how "actual, forward-looking" costs are calculated, it appears that they mean the determination of "forward-looking" costs, but using a short-run time horizon on the order of 3-5 years rather than the long term horizon used in calculating LRIC. Under this standard, UNE prices would reflect the fact that much of the incumbents' existing investment is sunk and that "actual, forward-looking" near-term investment decisions made by the incumbents are constrained by this sunk investment.

49. Of course, because most of the incumbents' investment is sunk, the short-run (or intermediate-run) incremental costs of providing UNEs would be quite low because continued use of sunk investment incurs no cost. The incumbents therefore also ask the Commission to allow them to recover both the full reproduction cost of the sunk facilities *and* the higher unit costs of the upgrade – a combination of costs that no efficient firm would ever incur "in the real world" – in either the long run *or the short run*. In short, the incumbents' actual forward-looking cost standard is really a hybrid reproduction cost-plus standard, in which all investment, including investment sunk over the short run, would be valued at its reproduction cost, and would also include the cost premiums paid for piecemeal capacity additions.

50. This has no foundation in economics and is logically incoherent. It is also unnecessary to protect against the "costs" associated with setting UNE rates based on an overly-

hypothetical network that could never be achieved by even an optimally efficient carrier. *See Notice* ¶ 60. To the extent that existing TELRIC models are not sufficiently "granular," that can be remedied without the rigid insistence on the use of "existing" design that would raise rates above efficient, competitive levels. At the same time, attempting to model "actual, forward-looking" networks is no more accurate, reliable and transparent than attempting to model a "hypothetical, efficient" network. *See infra* Part IV.C.

A. Existing Price Cap Regulation Is Not A Basis For Using An Incumbent's "Existing" Network As A Proxy For An Efficient, Forward-Looking Network.

51. In the *Local Competition Order*, the Commission expressly rejected the notion that long run incremental costs should be based on existing network design, but instead required that they be "measured based on the use of the most efficient telecommunications technology currently available and the lowest cost network configuration." 47 C.F.R. § 51.505(b). In so holding, the Commission rejected a standard that used "existing network design and technology that are currently in operation" on the grounds that it would allow "incumbent LECs t[o] recover costs" as "essentially an embedded cost methodology" that "reflect[s] inefficient or obsolete network design and technology" *Local Competition Order* ¶ 684. Despite these unambiguous (and correct) findings, the *Notice* asks whether the Commission should reverse course and "presum[e]" that embedded costs and existing network design in fact reflect efficient, forward-looking costs. *Notice* ¶¶ 55-58. In particular, the *Notice* asks whether the advent of "price cap" regulation 10 or 15 years ago has given incumbents enough incentive to adopt efficient network

design and practices that embedded investment levels and operating costs have become a good proxy for forward-looking efficient values. *Notice* ¶ 58.[12]

52. The answer is no. Treating the incumbents' existing network design and practices as efficient, or even adopting a rebuttable presumption that they are efficient, would subvert LRIC-based pricing in practice. There is simply no basis in economics to presume in this context that existing network design and practices are efficient. In fact, as explained below, it is only logical to presume the contrary. The incumbents have never been subject to the discipline of effective competition.

53. Although price cap regulation may attenuate the strong incentive to pad rate bases that exist under rate-of-return regulation, it still does not reliably and practically provide incumbents with the same incentive to be efficient as effective competition does.[13] At the outset, it must be recognized that "price caps" regulation is not a perfect substitute for the unyielding discipline of effective competition. Under a "typical" price cap regime, an incumbent is required to charge rates below a price cap index that is tied, to some degree, to the expected change in the underlying costs of providing service. The incumbent, therefore, has incentive to reduce its costs below the level of the price cap index, and the lower it reduces its costs, the higher profits it may earn. This reflects only a portion of the incentives facing a firm in a fully competitive

[12] As explained in the Declaration of Mr. Lee, the actual service lives of the equipment comprising large portions of RBOC plant are well over ten years, and thus pre-date price caps. Lee Decl. ¶¶ 10-45.

[13] In his accompanying declaration, Dr. Lee Selwyn rebuts the *Notice*'s implicit factual premise that incumbent carriers have been subject to "pure" incentive regulation at both the federal and state level for a significant time period. In this declaration, I emphasize that, as a matter of basic economic theory, the imposition of price cap regulation on the incumbents in the 1990s is not a basis for "presuming" that its embedded costs, network design, and practices are representative of those that would obtain in a competitive market.

environment. Firms in competitive markets can increase their profits by achieving a cost structure lower than their competitors. But firms in competitive markets that fail to achieve the most efficient cost structure also face the real prospect of not just a decrease in profits, but the loss of substantial market share and, potentially, being driven from the market altogether. Price cap regulation does not impart this latter powerful incentive.

54. This is particularly true with respect to innovation competition. In dynamic, competitive markets, the failure of a firm to offer new and better service can have catastrophic impacts on the business. Under price caps, failure to innovate may have no impact on the profits that an incumbent earns because there is little, if any, competition for the price-capped services. Price caps are also imperfect because they do not constrain an incumbent's choice of quality. Thus, an incumbent subject to price caps – but not competition – can chose to cut costs by investing less in quality.

55. Moreover, as the Supreme Court recognized in *Verizon*, "price caps do not eliminate gamesmanship." *Verizon*, 535 U.S. at 486. Price cap regulation tries to break the connection between a carrier's costs and the rates it charges – and thereby eliminate an incentive a carrier under rate of return regulation has to inflate its rate base and earn a return on capital – but it does so only imperfectly. This is because, in practice, price cap regulation is effectively only a modified form of rate-of-return regulation. The "index" used to adjust rates is always subject to change by the regulator, and the typical basis for altering the index is that a company's costs have increased at a greater rate than the index. Kenneth Train, *Optimal Regulation* 327 (1991) (under price cap regulation, a firm will have incentive to "waste so as to convince the regulator to allow a higher cap"). By overinvesting in network capacity, the incumbent provides

itself with a powerful argument to seek adjustments to the index that would allow the incumbent to increase its rates. *Id.*

56. As explained in Mr. Lee's declaration, it is also important to recognize that, even putting these considerations aside and assuming counterfactually that price cap regulation perfectly replicates the dynamics of competitive markets, the incumbents' outside plant was largely deployed during the period of rate-of-return regulation. Once excess network capacity is installed, it makes no sense to eliminate it as the going-forward costs of carrying excess capacity are negligible compared to the costs of removing it. And in areas where demand has been relatively flat or declining, that excess capacity will persist for a long time.

57. Likewise, because the ILECs use legacy networks that were initially deployed decades ago and that include long lived, sunk assets, there can be no basis for concluding that existing network design is efficient. That is because, as explained above, subsequent investment decisions are constrained by the sunk nature of the assets and do not necessarily reflect the most efficient practice. For example, as explained in the Declaration of Mr. Riolo, the incumbents may have deployed outside plant to serve a particular area, and then incrementally deployed additional outside plant to serve incremental demand. But the routes that would be used and the cables that would be deployed to serve the current demand most efficiently without any constraint from history will not be the same routes and cables used in the piecemeal expansion. In other words, while each incremental change an incumbent makes to its network may be efficient on the basis of short run considerations and the constraint of the sunk nature of its prior investment, the series of short run optimization decisions that the incumbent makes does not result in a network that is today optimized to serve current demand.

58. Finally, it is also important to understand that to the extent that UNE rates are based on existing network design, that re-establishes an express link between embedded costs and rates that gives the incumbents an incentive to engage in inefficient practices to drive up UNE rates. For example, to the extent that "existing" fill factors are taken as dispositive (regardless of efficiency), an incumbent would then have an incentive to over-invest in capacity. By maintaining excess capacity, the incumbent is potentially able to price squeeze competitors by inflating UNE rates to a level that preclude competition.

B. The So-Called "Actual" Forward-Looking Cost Standards Proposed In The *Notice* Are Fundamentally Flawed.

59. In the *Notice*, the Commission asks whether it should retain its basic standard of setting UNE rates on the basis of forward-looking costs but, instead of determining forward-looking costs on the basis of a long run time horizon as its rules currently provide, determine forward-looking costs on the basis of some "objective time horizon (*e.g.*, three to five years)." *Notice* ¶ 54. This methodology, which the incumbents have advocated under the rubric of the "actual forward-looking cost" standard, is alleged to calculate more realistically the "forward-looking" costs that the incumbent incurs to provide UNEs as opposed to TELRIC, which is alleged to calculate "hypothetical" costs.

60. "Actual costs" to economists means economic costs rather than accounting costs. The only types of "actual" costs that are forward-looking are those that are (or will be) incurred incrementally by an *efficient* provider relative to some planning period of time – *i.e.*, short-run during which sunk capital stays constant, long-run during which all capital is allowed to vary, or perhaps intermediate-run incremental costs over a planning period in which some but not all capital is allowed to vary. Here, the *Notice* is vague as to what time horizon it is contemplating

(other than one that is less than the long run). Thus, I discuss both the possibility of basing UNE rates on the basis of short-run incremental costs and intermediate-run incremental costs.

61. Setting UNE rates on the basis of short-run incremental costs would result in dramatically *lower* UNE rates. Where a large share of investment is sunk – as with local telephone facilities – the short run incremental cost of operating with a mix of new and used assets must be less than TELRIC. Otherwise, it would simply make sense to re-build the efficient network and "start over." This basic economics explains why, in the short run, it is often rational and efficient for firms to make incremental purchasing decisions that would be inefficient if the firm were starting from scratch (*e.g.*, buying costly add-on switching equipment, using duplicate cable, etc.).

62. The *Notice*'s suggestion that the relevant network be defined as "one that incorporates upgrades planned by the incumbent LEC over . . . three or five years" illustrates this point. As explained in the declaration of Mr. Lee, most local network assets have economic lives in excess of 3-5 years. As noted, much of the investment in those assets, once made, is sunk. And, particularly in the current economic environment of declining demand, many, if not most, of those assets are expected to have ample spare capacity for the foreseeable future. For sunk investment in long-lived assets that are not expected to require replacement or run out of capacity in next 3-5 years, short-run incremental investment costs should be well-below long-run incremental costs (where the costs of all the facilities are considered variable).

63. In this regard, it must also be recognized that even where additional capital expenditures are necessary, the incremental cost of long-lived assets that an incumbent plans to buy during the short term study period is far *less* than the full purchase price of those assets.

That is because the cost attributed to the study period would not include the present value of the expected future stream of income from the assets at the end of study period.

64. To the extent that the *Notice* is proposing some sort of intermediate run of costs, that standard too is flawed. As described in the *Notice*, the intermediate-run incremental cost measure would not simply compensate the incumbents for those costs that they incur in the intermediate-run, presumably because, similar to a short run approach, this would lead to low UNE rates that do not recover the sunk costs of assets that are fixed over the long run. Instead, the *Notice* appears to be proposing a hybrid concept in which all fixed and sunk costs would be covered by prices for UNEs that would be set based on the intermediate-run incremental cost of some rate of growth in demand. Thus, prices for all units of demand, including existing demand, would also be based on the cost per unit calculated for growth units of marginal demand.

65. The basic flaw in the incumbents' proposed standard is the incoherent inconsistency of its treatment of sunk investment and incremental costs. The incumbents first ask that forward-looking, incremental costs be calculated from the perspective of a near-term time horizon, in which most of its network investment as sunk. The incumbents take this approach to justify the efficiency of piecemeal network expansion, which is rational only in the short- or intermediate-run, but not in the long-run.[14] At the same time, however, the incumbents completely disregard the radical downward valuation of existing sunk investment that the short-run or intermediate-run time perspective requires. As explained above, consistent application of a short-run or intermediate-run perspective would lead to costs well below LRIC because, in any

[14] The reason for this is that piecemeal additions to capacity are not intended to optimize overall network efficiency. And where, as the case here, the existing plant may not have been efficiently constructed, the piecemeal additions are almost certainly not optimally efficient.

time period less than the long-run, the majority of the incumbents' capital assets remain fixed and sunk, and the incremental costs of providing services over those assets is near zero. Rather than value those sunk assets at levels which reflect the low opportunity cost of these assets in the short and intermediate run, the incumbents ask that their existing sunk investment be valued as if it were all being purchased anew. Further, to compound the inconsistency, they assume that the entire inventory of sunk assets is purchased at unit costs that include the price premiums charged by equipment vendors for piecemeal expansion. This is a hybrid with economic meaning over neither a short run nor a long run time period. It is systematically biased upward, and it is not a measure of economic cost.

66. As I explain in greater detail below, the clearest example of the flaws in the incumbents' proposal involves the cost of local switching capacity. Generally speaking, the unit cost of switching capacity traditionally has been much lower when purchased as part of a new switch than when subsequently purchased as an add-on increment to the capacity of an existing switch. Under the incumbents' pseudo-short run approach to costing, they seek to determine the "mix" of switch capacity that they will purchase over the next few years. Because they already have in place switches to serve their existing demand, their "forward-looking" purchases account for only a small fraction of their overall capacity requirements. Further, most of their "actual" purchases will be of piecemeal, add-on switching capacity, and very little will be capacity that is purchased "new" as part of an initial switch purchase. The incumbents then apply the ratio of the new/add-on capacity to derive the costs of the capacity necessary to serve their *overall* demand, regardless of whether or not their existing switch capacity was purchased new or as an add-on.

67. This approach exemplifies the internal inconsistencies of the hybrid costing approach proposed by the incumbents. The incumbents are simultaneously seeking to force

CLECs to pay for switching capacity at the higher unit costs of piecemeal upgrades—upgrades that are economically rational only because of the sunk nature of existing switching investment—yet seek to treat the entirety of that sunk investment as an incremental expense. To compound the inconsistency, the incumbents would also value the sunk investment at the same unit cost as the piecemeal incremental capacity additions.

68. Finally, the notion that UNE rates should be based on the costs of reproducing the incumbent's existing network in its current configuration and technology mix is also unacceptably inconsistent with economics. *Cf. Notice* ¶ 53. This is a measure of reproduction cost—the cost of reproducing the particular physical assets that happen to be in the ground today. The forward-looking cost of the actual ILEC network, however, is not the cost of reproducing or cloning that actual network, but the cost of reproducing its *capabilities*, using the most efficient technology available today.[15] Because telecommunications technology advances over time, forward-looking cost is likely to be substantially below reproduction cost. In a competitive market, no one would pay a premium to purchase an old inefficient network over a new and efficient network of equivalent capability.

C. Increasing The Geographic Detail And Realism Of The Model.

69. The *Notice* seeks comment on a proposed re-definition of the TELRIC rules that "more closely account for the real-world attributes of the terrain and topography of an incumbent's network in the development of forward-looking costs." *Notice* ¶¶ 52-53. In theory,

[15] Identical capability means a network that offers telecommunications services of the exact same type, quantity and quality as the reference network. Note that it would be absurd to value an existing ILEC network at the cost of reproducing it in both capability and configuration. Many pieces of equipment in existing networks are no longer in production, and thus are no longer generally available. Other pieces may be in a dilapidated state such that no precise replicas exist for purchase.

of course, if the increased costs associated with obtaining such "atomistic" detail and incorporating it into the cost model are offset by likely increases in accuracy, then the Commission should adopt the proposal. However, it is not clear that this outcome holds.

70. First, it is currently not possible – let alone economically feasible – for CLECs to obtain all of the accurate and verifiable information relating to the "real-world" "terrain and topography" of an incumbent's network. *Id.* Much of this information is held exclusively by the LECs. Therefore, unless the LECs are required to make such information available in a timely fashion to all parties in UNE rate cases, this proposal is procedurally infeasible.

71. Second, the LECs' plant records are notoriously unreliable. With respect to the incumbents' central office equipment, for example, Messrs. Klick and Selwyn explain that the FCC staff determined years ago that the LECs' data contains "phantom" assets, indicating that all of the LECs' records would be similarly unreliable. Messrs. Klick and Selwyn further explain that the incumbent carriers' outside plant records reflect outdated cable routes and/or cable descriptions, and include redundant or duplicate plant.[16] For example, in undertaking Project Pronto, SBC overlaid fiber facilities on top of existing copper facilities. As a result, SBC's outside plant "records" would reflect much more outside plant than actually needed to provide existing services.

[16] As Mr. Klick explains, the reason for this is that, prior to the mid-90s, the incumbents outside plant records were all "hardcopy." When the incumbents moved to computerized records, they rarely went back and tried to incorporate the historical records – which themselves had been modified numerous times. Further, incumbents routinely "groom" their outside plant, which means that they disconnect unused plant and remove it from the accounting records although it is often still shown on the outside plant cable diagrams.

72. The bottom line is that until these numerous problems are resolved, and the information asymmetry between incumbents and other interested parties is resolved, the Commission should not require state commissions to rely on "actual" LEC deployment data.

73. In any event, there is no reason to assume that injecting greater geographic realism into the models would necessarily produce higher cost estimates. As the FCC staff itself has recognized, cost proxy models that utilize right-angle routing – such as the Synthesis Model and the default HAI distribution routing algorithm – tend to *overstate* efficient route distances. *VA Arb. Order* ¶ 180. And, as Mr. Klick demonstrates in his separate declaration, where incumbent geocoded customer data are unavailable, the customer location algorithms tend to disperse customers more widely than they are in actuality, causing the models to overstate overall loop lengths. Thus, if objective *actual* customer location and routing data were consistently applied, this is unlikely to substantially increase costs, and might cause costs to decline. In addition, sharing across all services carried on the network is not captured fully in TELRIC models.

74. Finally, it is important to recognize that the determination of the routing and terrain data used to model forward-looking costs is a conceptually distinct issue from the choice of whether to adopt the use of short-run or long-run incremental cost models. *Cf. Notice* ¶ 56. Whether customer locations, geographic barriers, and rights-of-way for cable conduits are modeled with geographic precision or simplifying abstraction is conceptually distinct from the question of whether the costing time horizon is long run vs. short run, let alone whether the relevant measure of cost is forward-looking cost vs. embedded cost or reproduction cost.

V. CONCEPTUAL ISSUES REGARDING SPECIFIC INPUTS

A. Technology.

75. The Commission correctly notes that "it is unlikely that any carrier, no matter how competitive the marketplace, would deploy new technology instantaneously and ubiquitously throughout its network." *Notice* ¶ 68. The Commission asks how this fact affects its prior decisions to base the cost of UNEs on the most efficient new technology currently available. *Id.* The answer is that it has no impact on its prior decision: the two statements are perfectly consistent with one another.

76. To be sure, incumbents will not in reality rip out all old technology in its network and replace it with new technology whenever it becomes available. *Cf. Notice* ¶ 28. But that is not the relevant issue. The relevant question is how the economic *value* of the technology in the incumbent's network is affected by the availability of new, more efficient technology. And the answer to that question is straightforward: The economic value of the old technology is limited, or "capped," by the forward-looking economic value of the new technology. *Accord* Baumol Essay.

77. A simple example brings the point home. The economic value of a computer purchased by an incumbent in 1998 cannot exceed the cost of the new and far better computers that are available today, because no economically rational consumer would be willing to pay a higher price for an old computer than would be paid for a brand new faster computer. Therefore, although the old computer was not "ripped out" and replaced with a new computer, the economic value of the old computer is capped by the value of the new computer. The same fundamental economic principle applies to all of the equipment in the incumbent's network: The economic value of the incumbent's network cannot exceed the forward-looking economic costs of a

network deployed with the newest most efficient technology available today. *Accord* Baumol Essay.

78. The incumbents' own behavior confirms that the economic costs of continuing to use the incumbents' existing networks are lower than the cost that a "flash-cut" to the newest technology would impose. If the opposite were true, then the incumbents presumably would have made the switch.[17]

79. It is hardly surprising that the economic costs of the incumbents' existing networks are lower than the costs of an efficient forward-looking network. Much of the investment in the incumbents' existing networks is sunk. The forward-looking cost of a flash-cut to all-new equipment would be more than the economic costs of continuing to operate the old equipment. An example from the coal industry illustrates this point. Utility companies have continued to use very outdated "coal-fired" technology for years after those plants had outlived the "economic lives" that were anticipated when installed. This phenomenon can be economically rational, even though if one were investing today, distributed generation using combined cycle gas turbines (rather than outdated coal-fired plant) could be more efficient in meeting demand. This would be the case as long as the operating and opportunity costs of continuing to operate these plants going forward are below the cost today of replacing those plants with new units. Thus, permitting electric utilities to recover costs based on the most up-

[17] It is important to note that there is another factor that tends to make forward-looking economic cost estimates using currently available technology relatively high cost estimate compared to the incumbents' actual costs. Specifically, the estimation of TELRIC generally has not recognized cost levels of "current" equipment other than those that are already well established, based on at least several years of widespread deployment of a technology in the incumbents' networks. As a result, cost estimates do not reflect the full downward cost pressure imposed by the absolute most up-to-date technology.

to-date technology deployed in the most efficient fashion would both encourage new utility investment, where needed and efficient, and more than compensate existing utilities for using their embedded coal-fired facilities. For the same reasons, permitting incumbent local telephone carriers to recover costs based on the most current technology deployed in the most efficient fashion also encourages new utility investment, and more than compensates existing incumbents for using their embedded network.

80. These fundamental economic principles would apply even if the Commission were to abandon its prior, and correct, position that proper forward-looking economic cost studies are based on the use of the most currently available technology, and instead permit cost models to assume the use of "analog switches or older versions of digital loop carrier systems." *Notice* ¶ 69. As demonstrated above, the economic value of the existing technology is not the price originally paid for those assets (original or embedded cost), nor the cost of duplicating those assets today (reproduction cost). Rather, the economic value of those assets is, at most, the cost of providing the same functionality with the most efficient technology available today. Accordingly, if outdated "analog switches" are used to model costs, the value of that equipment must be adjusted downward to reflect the lower productivity and higher capital and operating costs of those obsolete technologies compared to the newer technologies. Likewise, if the model assumes the continued use of "embedded loops," those assets likely must be valued *upward* to account for the greater capital costs of providing their functionality with newly installed facilities today. *Accord* Clarke Essay at 4. Of course, to simplify the cost modeling process, state commissions could employ the prices and productivity of the newest equipment as a proxy for the value of the older equipment. As noted, this simplifying assumption is likely to overstate

what the incumbent will actually be spending going forward, since otherwise the cost-minimizing incumbent would already have purchased the new equipment.

81. The Commission also asks how state commissions should "determine the price for equipment in the incumbent LEC network that no longer is widely used in the industry." *Notice* ¶ 70. Again, the same basic economic principles apply. The economic value of that equipment is capped by the value of functionally equivalent (or, if necessary, superior) the new equipment available in the marketplace. Therefore, the value of those assets can conservatively be estimated using the simplifying assumption that all of the equipment in the network is the most efficient up-to-date technology that is commercially available.

B. Fill Factors.

82. The *Notice* asks what guidance the Commission should give state commissions in setting "fill factors" in TELRIC cost models. *Notice* ¶¶ 74-75. Fill factors are a measure of spare capacity. As the fill factor increases, the amount of spare capacity decreases.

83. The theoretical standard for efficient fill factors is straightforward. Installation of spare capacity is costly. It requires more investment today than is needed to accommodate existing, revenue-producing services. Installing spare capacity in anticipation of future growth in demand is nonetheless efficient if the cost of carrying the extra capacity before customers demand it is less in present value that the cost premium needed to satisfy growth in demand through piecemeal additions to cable capacity in the future. Thus, an efficient carrier will balance (i) the costs of piecemeal expansion that are avoided by stockpiling extra spare capacity today, and (ii) the carrying costs of that spare capacity.

84. The incumbents have maintained that "actual" fill factors can be presumed to achieve this balance because the incumbents have been subject to "incentive" regulation for

nearly 10 years. *See Notice* ¶ 74. As explained above (and in the declarations of Messrs. Klick and Selwyn, however, this claim ignores the fact that practical price cap regulation provides, at best, only imperfect incentives for efficient operation, *accord*, *Verizon*, 535 U.S. at 486 ("price caps do not eliminate gamesmanship"); *LEC Price Cap Reform Notice*, 1995 WL 564434, ¶ 21 (price caps provide only "imperfect" incentives to minimize cost). The incumbents' reliance on price caps also ignores the specific reality that the incumbents have not even been subject to pure price caps.

85. Further, even if price caps somehow eliminated all incentive to deploy excess capacity, the incumbents' actual fills still could not be validly presumed to be efficient. *See, e.g.,* As explained in the declaration of Mr. Riolo, there can be no serious dispute that in the past the incumbents deployed excess capacity in their networks (either as a result of inefficient regulatory incentives or an overcautious failure to follow efficient practices). This legacy capacity will be reflected in existing fill factors, as it does not make sense to remove excess capacity once deployed. In addition, excess capacity can develop as a result of shifts in demand over time due to unexpected changes technology and population growth. Finally, I understand from Mr. Riolo's declaration that recent technological developments, such as "next generation digital loop carrier" ("NGDLC"), greatly reduce the need for spare capacity in local networks, but that incumbent carriers have not yet fully upgraded their networks to reflect such advancements.

86. For the reasons I have explained above, it would likewise be inappropriate to set fill factors on the basis of the incumbents' "actual, forward-looking" plans over a short-term planning horizon. I would emphasize, however, that if such a standard were adopted literally, it would likely lead to much *higher* fill factors than currently set by state commissions. If a short-term planning horizon were used, it would make little sense to deploy any significant levels of

excess capacity because there is, in the short term, unlikely to be a substantial increase in demand that would require that incremental capacity. Indeed, in light of the fact that, as I understand it, the incumbents are forecasting *declining* demand in the short-term, *see, e.g.,* Riolo Decl., fill factors using that planning horizon should be close to 100%.

87. To this point, the focus of my discussion has been on the level of efficient capacity that would be carried by an efficient incumbent carrier operating in a contestable market. That an efficient carrier may carry excess capacity intended for future demand does not, however, mean that the full costs of that efficient excess capacity should be recovered from *current* ratepayers. Murray Essay at 3-4. Rather, to determine the share of the costs of spare capacity to be recovered from current ratepayers, one must net out the present value of the expected future contribution from future customers. A network that is properly sized, with the costs of spare capacity properly apportioned between present and future ratepayers, should cost current ratepayers no more than, and possibly less than, the cost of a network built and reserved only for current ratepayers.[18]

88. This conclusion flows directly from the contestable market analytic framework. In a market subject to potential competition, any attempt to charge current ratepayers for capacity used only to serve future customers would render the incumbent vulnerable to competitive entry by a firm that charged present customers only for the capacity needed for present demand – or even by a firm that built a network with no spare capacity for growth and charged customers only for the capacity it had built. *Accord, Notice* ¶ 75 (asking how

[18] I recognize that some spare capacity is necessary for administration, maintenance and short-run peak loads rather for long-term future growth. While this spare capacity is appropriately attributed to these purposes (and thus should be recovered from current ratepayers as a current (continued . . .)

competition affects incentives to maintain excess capacity). Moreover, a firm will not make the right investment decisions unless it bears the risk of recovering the carrying cost of today's spare capacity from future customers.

89. The incumbents' economics experts have conceded this very point. In the recent arbitration before the Commission concerning the UNE prices charged by Verizon in Virginia, Verizon's economic witness, Dr. Howard Shelanski, acknowledged that "I would *not* expect to see the firm recover all of its costs for the future period in a competitive market today—by all of its costs I mean to the point that it has no costs except marginal costs to recover in that second period." Tr. 2985 (emphasis added). Similarly, the incumbents' expert Dr. Kahn has (correctly) acknowledged that present customers should not have to pay for all of the spare capacity built for future customers:

> We have already posed the question of the proper rate [of depreciation] when a plant is built far in advance of total need – perhaps because there are great economies of scale. To charge depreciation in equal annual installments would be to impose a disproportionately heavy burden on customers in earlier years, when much of the capacity lies idle. Considerations of fairness – the idle capacity is really for the benefit of future, not present customers – and economic efficiency present a case for something similar to SRMC pricing, which would have the effect of concentrating the capital charges in later years.

Alfred Kahn, *The Economics of Regulation*, vol. 1, p. 121 (1970). Thus, even if, as the incumbents have contended, basic network engineering principles dictate that they maintain sizeable excess capacity to accommodate future demand (*i.e.*, low "engineering" fill factors), the appropriate "effective" fill factors to be used in setting current network element rates should be

(. . . continued)
cost), spare capacity that is clearly reserved for future growth must be attributed to, and recovered from, that growth in demand when it materializes. Murray Essay at 3-4.

significantly higher so that the costs of that excess capacity are properly attributed to future users, not current users.[19]

C. Structure Sharing.

90. The *Notice* asks what guidance the Commission should give state commissions in setting "structure sharing" percentages. *Notice* 71-72. Structure sharing refers to how much of the cost of installing poles, digging trenches, and placing conduit would be shared on a forward-looking basis by an efficient carrier with other entities, including other telephone companies, power companies, or cable operators. Structure sharing percentages refer the portion of the cost of a common structure that is borne by an efficient carrier. A high sharing percentage means that the efficient carrier bears most of the cost of the common structures; a low sharing percentage means that the efficient carrier bears a smaller percentage of the cost of common structures.

91. The theoretical standard that should govern structure sharing percentages is straightforward. The costs of structures do not vary significantly with the number of other entities with which the structure is shared. Carriers, therefore, can substantially reduce their costs of providing service by sharing structure – and hence the cost of the structure – with other entities. Accordingly, an efficient carrier would seek to minimize the costs of its network by seeking to share structures with other entities to the maximum extent feasible.

92. A proper forward-looking LRIC model would thus account for the substantial sharing opportunities that exist for carriers on a forward-looking basis. And it is my

[19] Alternatively, the appropriate treatment of network capacity that is being reserved for future growth could be addressed using basic depreciation methods. Economic depreciation seeks to match demand for facilities with the time period for cost recovery. *See* Baumol, Panzar & Willig, *Contestable Markets and the Theory of Industry Structure* 384-89 (1988). Accordingly, capacity for which there is no demand during a particular time period should have little, if any, (continued . . .)

understanding that substantial structure sharing opportunities exist. *See, e.g.,* Riolo Decl. ¶¶ 12-25. Other entities that generally would welcome the sharing of structure costs include power utilities, gas utilities, electric utilities, all of which also provide facilities to virtually all residential and business customers in a particular geographic area. *Id.* Moreover, in many new developments, the building contractors often are willing to place telephone plant in the same underground trenches and conduit in which it already is placing the water, gas and electric lines in the development at no additional fee. *Id.* Indeed, many municipalities today demand maximum structure sharing in order to prevent the unnecessary disruption caused by deploying new structure (*e.g.*, digging up streets and planting telephone poles). *Id.*

93. Furthermore, as explained by Mr. Riolo, state commissions have recognized the need to account in the estimating of costs the substantial opportunities to share with other entities that are available to carriers. In addition to reflecting opportunities to share structure costs with other utilities, proper forward-looking cost models also should reflect opportunities for an incumbent's regulated plant to share structure with its non-regulated plant. For example, the Commission's *Triennial Review Order* continues to allow competitors to purchase certain facilities on an unbundled basis from incumbents, but in many circumstances denies competitors the right to purchase broadband capabilities (often provided over the same facilities) from incumbents. In those circumstances, the facilities or capabilities that are available only to the incumbent are "sharing" the same structure as the facilities or capabilities that are available to UNE customers. Sharing percentages should thus reflect those sharing opportunities. Failing to do so would mean that incumbents recover from UNE customers a portion of the costs for

(. . . continued)
depreciation-related expense at that time.

facilities or capabilities to which the UNE customers have no access. This cross-subsidization would be anticompetitive and inefficient. If the Commission is unable or unwilling to determine on a national basis how to assign sharing percentages among regulated and non-regulated services, it is critical that the Commission authorize state commissions to make those determinations.

94. The Commission asks whether it would be appropriate to use the structure sharing percentages that were available to the incumbent when the incumbent initially deployed its facilities. *Notice* ¶ 72. The answer is no. Such a method would be virtually impossible to implement and economically unsound. I understand that it would be virtually impossible to implement because, as noted above, the incumbents' networks have been deployed in a piecemeal fashion over more than a century. It would be extraordinarily difficult to identify when each piece of the network was deployed and the sharing opportunities that were available at that time.

95. Using sharing opportunities at the time of historical deployment would be economically unsound because it would send improper cost signals to the incumbents, and thus could result in inefficient investment and anticompetitive conduct. If incumbents were permitted to recover costs based on assumptions that the incumbent engages in very little structure sharing, incumbents would have less incentive to seek efficiently to maximize sharing opportunities in the future. And to the extent that incumbents do, in fact, seek to maximize sharing opportunities in the future, they would have an absolute cost advantage over UNE-based competitors, which would be paying UNE rates based on the incumbents' historic structure sharing percentages.

96. For the same reasons, it would be inappropriate for the Commission to use the incumbents' "actual" structure sharing percentages as "dispositive" evidence of the incumbents'

forward-looking structure sharing percentages. *Notice* ¶ 72. As Mr. Riolo explains, a result of the incumbents' successive piecemeal upgrades to its networks, there is no legitimate basis for assuming that the incumbents' "actual" sharing costs reflect those of an efficient carrier. Basing UNE costs on structure sharing percentages that reflect the incumbents' actual structure sharing therefore would result in the same economic inefficiencies and potential for anticompetitive conduct that arise when structure sharing percentages are based on the structure sharing opportunities available at the time the structure was initially deployed.

97. If the Commission nonetheless ultimately chooses to allow sharing percentages to be computed based on "actual" sharing percentages that are likely to occur in the next few years (*i.e.,* the short run), then the Commission also must recognize the logical impact of that decision on other portions of the overall cost methodology – indeed, all implications of a cost assumption must of course be included in an unbiased fashion. Specifically, if it is assumed that structure cannot be re-deployed in a more efficient way – *i.e.,* more sharing – it logically follows that much of the incumbents' investment in their existing structure is "sunk." And as I discussed above, the relevant economic cost of a network in the short run – *i.e.,* a network with more sunk costs – are significantly lower than the economic costs of a network in the long-run, where there are far more opportunity costs since the non-sunk expenditures constitute flexibly avoided costs. Thus, ignoring long-run sharing opportunities in favor of short-run opportunities would require a consistent economic cost study to ignore long-run economic costs in favor of the much lower short-run economic costs.

D. Switch Discounts.

98. The *Notice* seeks comment on the appropriate method for computing switch discounts. *Notice* ¶ 76-81. As explained in the Joint Declaration of Catherine Pitts and Terry

Murray, however, that question is too narrow. Pitts/Murray Decl. ¶ 12. Some switch cost models estimate the net cost of switching investment by calculating the list price of the equipment, and then applying discounts to the list prices. Other switch cost models, however, estimate the effective price of switching capacity directly. *Id.* At bottom, the computation of switch discounts in certain cost studies is only a means to an end – it is used to compute the efficient forward-looking cost investment in switching capacity. *Id.* Accordingly, the relevant question is more general: how to compute the net cost of switching investment.

99. First, the relevant cost of unbundled switching must reflect the prices that *incumbents* can obtain. This point is important because, as is universally recognized, incumbents receive massive discounts from the "list price" of a switch, because incumbents purchase such a high quantity of switches. As the largest switch purchasers, incumbents have a certain level of buying power vis-à-vis switch vendors. Pitts/Murray Decl. ¶ 19.

100. Second, one must recognize that switches are "modular." The number of lines that an existing switch can serve can be augmented by purchasing additional equipment (often referred to as "growth lines" or "add-on equipment") from the switching vendor. This point is important because the per unit cost of switching capacity purchased in a complete switch is generally much lower than the per unit cost of capacity purchased as additional add-on equipment. The lower per line price for a new switch reflects economies of scale in that a new switch usually includes the capacity to serve a very large number of lines. By contrast, add-on equipment is added to serve only incremental lines. Because an efficient carrier likely would purchase both new switches and future growth lines, the *average* cost of switching functionality (or the "average cost of a switch") depends on the relative number of new switches and future growth lines that would be purchased by an efficient carrier. Pitts/Murray Decl. ¶¶ 25-26.

101. To compute the average cost of a switch for an efficient carrier, one must know the number of lines served by new switches (at the lower cost) and the number of lines served by add-on equipment (at the higher cost). As noted, the relevant ratio of new and add-on equipment reflect those that would be purchased by an efficient carrier in a contestable market. An efficient carrier in a contestable market, of course, would seek to minimize switching costs. Accordingly, an efficient carrier would purchase the lower priced new switching capacity to serve, at a minimum, all existing demand. The more expensive add-on capacity would be used only to serve future demand, and only to the extent necessary.

102. These assumptions may lead to a conservatively high estimate of an efficient carrier's switching costs, because an efficient carrier likely would purchase sufficient new capacity, at the lower price, to serve not just current demand, but also to serve at least some future demand, thereby reducing the need later to purchase higher cost add-on equipment. Specifically, an efficient carrier would compare the discounted present value of the expenditure for a new switch installed in the future (discounted for both the time value of money and for the likelihood that the future demand may not materialize) to the present value of the expenditure for add-on equipment installed in the future. If the cost of the equivalent capacity in the new switch is lower than the cost of the capacity acquired in the add-on equipment, the carrier would purchase the new switch capacity rather than the add-on equipment capacity. As explained in the Murray/Pitts declaration, computing average switch prices based on the assumption that the more expensive growth lines will be used to serve *all* future demand produces a cost estimate that is the *most* that an efficient carrier would incur.

103. Although it is relatively straightforward to calculate current demand and, thus, the number of lines that will be served by the less expensive new switches, it is less straightforward

to estimate the number of lines that will be served by add-on equipment, because that estimate depends on projections of increases in demand for switched lines. The methodology for estimating future demand is addressed in the Murray/Pitts declaration. The Pitts/Murray declaration finds that an appropriate estimate for the growth in circuit switched lines – the relevant lines for computing unbundled switching costs – is about two to three percent per year. Accordingly, computing the number of lines served by add-on equipment in the network requires computing the number of switched lines that will be added to the network each year (assuming 2-3 percent annual growth) during the economic life of the new switch to which those lines will be added. And, of course, since the add-on equipment will be purchased in the future, the relevant cost of that equipment is the present value of the anticipated purchase price of that equipment.

104. Once these computations are complete, computing the corresponding average cost of a switch per line follows accordingly (*see* Pitts/Murray Decl.). The calculated value is the average of the cost (using the present value for the cost of the add-on equipment) of new and add-on lines, weighted by the relative number (discounted by timing) of each type of line. This method for computing switching costs is often referred to as the "life-cycle" methodology, because it computes the present value of the cost of a switch over the expected life of the switch.

105. This "life cycle" switch pricing methodology is also appropriate for computing switch discounts. The per line discounts available to carriers on new switches are far greater than the discounts available for add-on lines. Therefore, it is necessary to compute the appropriately weighted average new and add-on line discounts.

106. Incumbents have in the past advocated the use of an entirely different pricing methodology: using the number of new and add-on switch lines that the incumbents' actually plan to purchase over the next 3-5 years to calculate the weights for computing average switch

costs. This costing approach is economically unsound, and greatly overstates the forward-looking economic cost of switching capacity. Because the incumbents currently have a large inventory of new digital switches with long remaining lives, most of the incumbents' actual planned switch purchases are for add-on lines, which will augment the incumbents' existing switches. The incumbents' methodology therefore assumes that most switched lines will be served by very expensive add-on lines – indeed, the incumbents' methodology assumes that more lines would be served by add-on lines in a forward-looking network than are actually served by add-on lines in the incumbent's existing networks. (In the context of switch discounts, this methodology results in discounts that reflect the much smaller discounts received for growth lines, and then applies that small discount to *all* lines in the network.)

107. As explained above, this methodology does not measure any legitimate species of forward-looking costs recognized by economists. Obviously, this methodology does not measure long-run forward-looking economic costs because it is based only on a 3-5 year horizon. Moreover, it assumes that a carrier will purchase growth lines to serve both some current demand and all future demand. As explained above, however, in the long-run, an efficient carrier will purchase enough new switching capacity to serve at least existing demand, and would purchase growth lines to serve only future demand.

108. Nor is the incumbents' methodology a legitimate measure of short-run costs, since it does not treat any of the carrier's investment in existing equipment as sunk, inasmuch as it requires the firm to buy all of the equipment. Creating even more bias, this methodology requires firms to purchase all of that equipment at the high add-on prices. In effect, the incumbents' methodology replicates the purchasing decisions of a firm with substantial sunk investment – *i.e.,* the existing switching capacity – while ignoring the largely sunk character of

these past investments, which is the very factor that would cause a firm to retain the assets over the short run. No competitive market would allow a firm to recover such inflated costs from its customers.

E. Cost Of Capital.

109. One of the costs of a network element is the "cost of capital," or return on investment, sufficient to compensate lenders and equity investors for the capital invested in the assets needed by an efficient supplier of the network elements that are being leased by competitive carriers. *Local Competition Order* ¶ 700. The necessary rate of return depends on investors' perceptions of the risks that such a firm would face in its network element business. For UNE pricing, the allowed cost of capital must reflect only the risks of providing the network elements, and not the costs of the higher risks of providing retail services, for those costs "are not attributable to the production of network elements that are offered to interconnecting carriers and must not be included in the forward-looking direct cost of an element." *Local Competition Order* ¶¶ 691, 700. Because the provision of local telephone service is capital intensive, the cost of capital is an important part of overall costs, as measured under the TELRIC concept. If capital costs are overestimated, TELRIC-based prices will be too high. Excessive capital costs will therefore have the effect of deterring competition, encouraging inefficient construction of bypass facilities by entrants and generating counterproductive subsidies for the incumbents.[20]

[20] In its 1996 *Local Competition Order*, the Commission defined the relevant cost of capital as one that reflects the risk incurred in the business of leasing unbundled network elements at wholesale. *Local Competition Order* ¶ 702. Moreover, the *Order* has been interpreted as providing that the required return on investment would be defined by the "business risks that" the incumbents "face"—a reference to the risks that incumbents currently or foreseeably face, not the risks faced in a hypothetical competitive market. *Bell Atlantic-Delaware, Inc. v. McMahon*, 80 F.Supp.2d 218, 240 n.19 (D. Del. 2000) (discussing *Local Competition Order* ¶ 702). I understand that, applying this standard, most state commissions set the cost of capital (continued . . .)

110. In the *Triennial Review Order* the Commission "clarif[ied]" risk standard used to compute the cost of capital:

> [There are] two types of risks that should be reflected in the cost of capital. First, we clarify that a TELRIC-based cost of capital should reflect the risks of a competitive market. The objective of TELRIC is to establish a price that replicates the price that would exist in a market in which there is facilities-based competition. In this type of competitive market, all facilities-based carriers would face the risk of losing customers to other facilities-based carriers, and that risk should be reflected in TELRIC prices. . . . Second, we clarify that a TELRIC-based cost of capital should reflect any unique risks (above and beyond the competitive risks discussed above) associated with new services that might be provided over certain types of facilities. In the *Local Competition Order*, the Commission stated that different UNEs may have different costs of capital. We now clarify that the use of UNE-specific costs of capital is an acceptable method of reflecting in UNE prices any risk associated with new facilities that deploy new technology and offer new services.

Local Competition Order ¶¶ 680, 683.

111. In the *Notice*, the Commission asks for comment on this "clarification." As I explain in the section below, this clarification was unnecessary because the cost of capital calculation under the TELRIC methodology, particularly as I understand it has been applied by state commissions, already accounts for the relevant "risks of a competitive market" and any "unique risks" faced by the incumbents. As noted, the proper economic framework for computing UNE rates is that of a contestable market. The relevant cost of capital, therefore, is that which the incumbents incur given their status as the first-mover in a contestable market.

112. Moreover, to compute the cost of capital on the hypothetical construct that the incumbent is perfectly competitive is at odds with the premise of the *Triennial Review Order*, which expressly requires incumbents to make UNEs available *only where no facilities-based*

(. . . continued)
for the provision of UNEs in the range of 9 to 11 percent.

competition exists. Computing UNE rates based on the cost of capital for a perfectly competitive firm – which, as noted below, will not necessarily result in a higher cost of capital – may result in inefficient competitive investment. And, in any event, as discussed below, the current methods used to compute the cost of capital fully reflects the risks associated with reasonably expected competition.

113. In this section, I also explain that the Commission should take this opportunity to provide guidance to state commissions on the capital structure that should be used to set unbundled network element rates. Specifically, I demonstrate that it may be appropriate to set an element-specific cost of capital, and to the extent that the Commission persists on denying competitive carriers access to the most advanced capabilities of UNEs, this principle should result in a lower cost of capital than the incumbents' overall cost of capital.

1. Current TELRIC Models Use An Appropriate Cost Of Capital.

114. As I understand the issues, the fundamental purpose of requiring incumbents to unbundle network elements and offer them at the cost-based prices that would prevail in a competitive market is to prevent those incumbents from exercising the market power that they have over UNEs. *Local Competition Order* ¶ 679 ("Adopting a pricing methodology based on forward-looking, economic costs best replicates, to the extent possible, the conditions of a competitive market. In addition, a forward-looking cost methodology reduces the ability of an incumbent LEC to engage in anti-competitive behavior. Congress recognized in the 1996 Act that access to the incumbent LECs' bottleneck facilities is critical to making meaningful competition possible."). And there can be little debate that incumbents face little actual facilities-based competition for the wholesale leasing services that they provide to competitive

carriers.[21] In the *Triennial Review Order*, the Commission eliminated unbundled access to elements that it found could be supplied by competitive carriers – and, indeed, many "broadband" elements that the Commission itself recognized could not be duplicated by competitive carriers. *Accord, Notice* ¶ 88 ("We ask the parties to comment on the relationship, if any, between our unbundling rules and the risk of stranded investment."). Thus, the economic question for the Commission is whether the cost of capital for the provision of the network elements that remain subject to unbundling requirements should be set on the assumption that the incumbent faces full, facilities-based competition when, as the Commission already has concluded, such deployment is economically infeasible (at least for the foreseeable future).

115. Citing the Commission's statements in the *Triennial Review Order*, the *Notice* suggests that a high level of competitive risk must be assumed because its goal is to set UNE rates that would obtain in a fully competitive market. *Notice* ¶¶ 83-84. As I have explained above, the relevant economic paradigm that underlies the LRIC standard is not perfect (or near-perfect) competition, with multiple facilities-based competitors, but perfect contestability, a more general and robust model of competition.[22]

[21] In evaluating the competitive risk of supplying UNEs, the Commission must take care to distinguish the relevant risks here – the risks of an incumbent's *wholesale* business. Increased UNE-based retail competition does not increase the risk that an incumbent LEC will fail to recover its investment in network assets, because CLECs that compete with ILECs at retail by leasing the ILECs' local network capacity are still compensating the ILECs for the underlying network assets. As a result, UNE-based retail competition does not result in any increased risk. The relevant risk, then is that from *facilities-based* competitors. For the elements that are still unbundled, the Commission already has determined that there is little, if any, risk that the ILECs will lose their customers to facilities-based competition.

[22] One of the Bells' experts has acknowledged this very point. VA Arb. Tr. 3587 (Prof. Vander Weide) ("one of the assumptions of TELRIC . . . is that the market is perfectly contestable.").

116. In the contestable market paradigm, the relevant cost of capital, therefore, is that which the incumbents incur given their status as the first-mover in the contestable market. A cost of capital that exceeds that level would result in UNE rates that are above the incumbents' costs, thus discouraging efficient entry by competitors reliant on UNEs. A cost of capital below those rates would deter efficient investment by incumbents. A proper forward-looking economic cost model, therefore, should reflect the cost of capital incurred by the incumbent.

117. This conclusion is entirely consistent with precedent in other agencies adopting other "scorched node" cost models for setting rates. The precedents confirm that consistency with a long run forward-looking cost methodology does not require the assumption of high competitive risk. This fact is illustrated by the TELRIC-like cost standard used since 1985 by the Interstate Commerce Commission ("ICC") and its successor, the Surface Transportation Board ("STB"), to regulate rates paid by captive rail shippers. As implemented by the ICC and the STB, that test combines the forward-looking cost assumptions of perfect contestability with a cost of capital based on the competition and risks that the incumbent carriers actually face. *See Coal Rate Guidelines—Nationwide*, 1 I.C.C.2d 520, 534-37 (1985), *aff'd*, *Consolidated Rail Corp. v. United States*, 812 F.2d 1444 (3d Cir. 1987) (implementing stand-alone cost test with cost of capital based on conventional DCF or CAPM analyses of risks and capital costs actually foreseen by incumbent railroad carriers).

118. By contrast, computing the cost of capital based on some legal fiction of intense competition would clearly be contrary to this precedent, contrary to the principles of the *Triennial Review Order,* and would discriminate against new entrant carriers seeking to compete with incumbents in retail markets. As noted above, the impairment standard adopted in the *Triennial Review Order* requires incumbents to unbundle network elements only when the

existence of significant facilities-based entry is minimal. Hence, UNEs will be provided *only* when the competitive risk of facilities-based competitive entry is low, and the cost of capital incurred by incumbents to provision UNEs will also be low. Requiring competitors to pay prices for UNEs that are inflated by markups designed to compensate incumbents for competitive risks that they do not actually face would drive a wedge between the costs incurred by incumbents in competing for retail customers, and the costs incurred by competitive carriers. Allowing this discrimination threatens potentially to eliminate the very competition that the Commission is seeking to encourage.

119. Finally, it is important to recognize that computing the cost of capital based on the fiction that the incumbent faces substantial competition cannot be reconciled with UNE prices that allow recovery of LRIC. Competition from multiple facilities-based competitors tends to drive prices down toward marginal cost; and perfect competition results in prices that equal marginal cost exactly. Local telephone networks, however, have large sunk costs and economies of scale and scope. For firms with this cost structure, marginal costs are not only below long run incremental costs, but are close to zero. Hence, a UNE pricing model that replicated the performance of a perfectly competitive market, or any telephone market with multiple facilities-based competitors, would not compensate even an efficient provider for the cost of the facilities used to provide the UNEs.

2. The Current Methods Used To Compute The Cost Of Capital Account For The Relevant Risk.

120. I understand that the Bells' have supported computing the cost of capital based on the fiction of perfect competition because they believe that doing so will necessarily increase the cost of capital. That is not necessarily true.

121. As a preliminary matter, it is important to clarify what is meant by the cost of capital of a "competitive firm." The *Triennial Review Order* plainly does not mean the relevant cost of capital is that of today's competitive entrants. Today's entrants do not operate in a competitive market. Rather, they compete against entrenched incumbent monopolists, which substantially increases risk, and hence substantially increases these entrants' cost of capital compared to a firm that is competing in a competitive marketplace. Therefore, the *Triennial Review Order* must mean that the cost of capital should be based on the costs that an efficient carrier operating in a competitive market would incur.

122. The relevant inquiry, therefore, is whether the methods currently employed by state commissions to compute the cost of capital understates the cost of capital relative to that of an efficient firm operating in a competitive market for UNEs. And, in this regard, it is not at all clear that the current methods for computing the cost of capital result in estimates that are lower than those that such an efficient competitive carrier would incur.

123. As an initial matter, the methods currently used by state commission's to compute the cost of capital already reflect all existing competitive entry and any reasonable expectation of future entry. As explained in the Declaration of Terry Murray, states estimate the cost of capital using the incumbents' publicly traded stock and bond prices. In setting those prices, financial markets, of course, account for the impact on the incumbents associated with existing an future competitive entry. The current methods of computing the cost of capital thus already reflect competitive entry.

124. Furthermore, the current methods for computing the cost of capital overstate the cost of capital of the incumbents UNE business. As noted, the relevant cost of capital is that associated with the sale of UNEs, which, as the *Triennial Review Order* makes clear, is a highly

stable business due to the lack of facilities-based alternatives. But the methods used by state commission's to compute the cost of capital are based on the Bell Holding Companies' publicly traded stock and bond prices, they are not generally limited to solely the Bell's UNE business. Because the Bells' other non-regulated endeavors likely are more risky than that of the UNE wholesale business (which I discuss in more detail below), the cost of capital used by state commission's – one based on the Bell Holding Company – likely overstates the relevant cost of capital.

125. Because the current cost of capital estimates already account for all existing and reasonably expected future competition, and because the current cost of capital estimates are overstated because they are based on the Bell's holding companies rather than only on their UNE business, there is no basis to assume that the current cost of capital methodology is higher or lower than that of an efficient competitor.

126. In this regard, any assumption that incumbents earnings would decrease as the result of competitive entry, does not necessarily result in increased risk and corresponding increased cost of capital. To hypothesize competition may result in a one-time decrease in earnings, but that it does not necessarily correspond to a one-time increase ongoing risk which would result in increased cost of capital.

127. All of these basic principles is confirmed by Mr. Selwyn's empirical analysis. In that analysis, Mr. Selwyn explains that the cost of capital incurred by a particular firm is not necessarily related to the number of competitors in the market.

3. Capital Structure.

128. The Commission should make clear that the "actual" capital structure of incumbent carriers cannot be used for determining the capital structure used in setting UNE

rates. Incumbent carriers typically engage in many lines of business in addition to leasing network elements to competitive local carriers. The Bells, in particular, provide wireless and broadband services and the facilities used to provide these services are (largely) denied to competitive carriers. There is simply no reason to believe, *a priori*, that the capital structure of such multi-service firms is the one that would be used by an efficient carrier engaged in the business of leasing unbundled network elements. To the contrary, for the reasons stated above, the leasing of network elements is a generally low risk business because the services provided use facilities that the Commission has determined cannot feasibly be duplicated by competitive carriers.

129. Further, even if the incumbents were purely engaged in the business of leasing UNEs, it would still be inappropriate to use their existing capital structures. Basic LRIC principles dictate that the capital structure be one that an efficient firm would maintain *over the long run*. Given the fluctuations of the market and the costs involved in modifying capital structure – such as issuing debt, recalling debt early, re-purchasing shares, etc. – use of existing capital structure could result in network element rates being set on the basis of a capital structure that is not an efficient one for a firm engaged in the business of leasing UNEs.

4. State Commissions Should Retain Discretion To Set UNE-Specific Cost Of Capital.

130. I agree with the preliminary conclusion of the *Notice* that states should retain the "option of establishing UNE-specific costs of capital." *Notice* ¶ 90. There is certainly no general law of economics that predicts that a carrier will face the identical risk for each type of service it provides. Further, carriers often purchase only a subset of the incumbents' facilities. For example, "data LECs" purchase access only to the incumbents' loops, not their switches. Thus, in a perfectly contestable market, an incumbent that sought to use a "blended" cost of

capital that was applied uniformly to all of its leasing services would face the possibility of entry from another carrier for its relatively "low risk" services.

131. This applies with particular force here. The facilities that incumbents must unbundle are mature, well-established, and relatively low in risk – unlike novel broadband services to which competitive carriers have little access. Hence, the cost of capital for these elements should be lower than a company-wide cost of capital.

132. I recognize that as a practical matter it may be difficult to determine with sufficient granularity the difference in risk of deploying different types of facilities because capital costs are usually estimated using more aggregate data. Thus, given these potential difficulties, I would not recommend that the Commission mandate that state commissions develop such UNE-specific costs of capital. That said, to the extent that state commissions are able to determine reliably the relative risks of deploying certain network facilities, they should be permitted to adopt different capital costs for such facilities.

F. Depreciation Expense

133. The *Notice* asks for comment on two sets of depreciation-related issues: the appropriate standards for determining asset lives; and the appropriate time pattern for recovering depreciation expense over the expected life of an asset. I discuss each in turn.

134. Depreciation, to an economist, is the decline in the economic value of an asset over a specified period of time. The economic value of the asset equals the greater of (1) the price at which the asset could be sold, net of brokerage, salvage and other transaction costs, or (2) the discounted present value of the expected future stream of income generated by the asset over its remaining life.

135. Depreciation has three causes: physical deterioration caused by use of the asset; physical deterioration caused by the passage of time, not the use of the asset; and obsolescence caused by innovation, which makes available substitute assets of greater quality or efficiency.

136. The first cause of depreciation is exemplified by the usage-related wear and tear on assets such as automobiles, computer printers, light bulbs, and the like. The replacement of electromechanical equipment with fully electronic equipment in telecommunications central offices has greatly reduced the significance of wear and tear as an element of depreciation in the local telephone industry.

137. The second cause of depreciation—physical deterioration unrelated to the amount of usage—is a significant factor for cable, remote terminals, and other outside plant assets that are exposed to the elements. Exposure to freeze-thaw cycles and moisture can cause connections to oxidize, insulation to crack, and water to enter – all degrading the performance of assets regardless of the intensity of their use. Clarke Essay at 3-4.

138. The third cause of depreciation—technological obsolescence—can result from both technological innovation and changes in customer tastes and desires (which may in turn result from innovation in complementary goods or services). The effect of technological change on the economic value of existing assets can be upward or downward. For example, I understand that increased demand for data Internet services has tended to reduce the value of telecommunications equipment capable primarily of providing circuit-switched voice services (*e.g.*, traditional Class 5 switches), and increased the value of telecommunications equipment that is designed to provide IP services (*e.g.*, packet routers). I also understand that the advent of DSL technology (a complementary input) has enhanced the value of all-copper loops.

139. Accountants have developed an elaborate array of methods for projecting the service lives and salvage values of assets, as well as various time patterns (*e.g.*, straight line, accelerated, and deferred) for recovering the depreciable investment in an asset over its lifetime. To an economist, however, a depreciation method is consistent with economic depreciation principles if the results satisfy two conditions (with the qualification, of course, that depreciation necessarily involves projections about future prices and market conditions; hence, there is inevitably a range of uncertainty in this area). First, the present value of the future stream of annual depreciation charges should equal the current value of the asset. Second, the time pattern of depreciation recovery should appear to be sustainable in the face of anticipated potential competitive entry. A depreciation method that satisfies both tests provides full compensation to the owner of the asset, and replicates the performance of effectively competitive or contestable markets.

140. Paragraphs 94-101 of the *Notice* ask for comment on the appropriate standards for estimating asset lives, and, in particular, whether accounting lives established in accordance with Generally Accepted Accounting Principles ("GAAP") provide better estimates of forward-looking depreciation lives than do the regulatory lives approved in recent years by the Commission and its state counterparts. These are empirical questions, which another witness for AT&T, Richard B. Lee, will discuss in detail. I would like to emphasize, however, that the Commission is absolutely correct in insisting on "objective evidence" before accepting claims that changes in technology have changed, or are likely to change, asset lives. *Notice* ¶ 99. There is no basis for simply assuming that the recent technological advances have made asset lives shorter, or that anticipated future changes in technology will do so. As shown by Mr. Lee and another AT&T witness, John Klick, innovation often has lengthened asset lives. In this regard,

the continued growth in depreciation reserves noted by Mr. Lee strongly suggests that the regulatory asset lives approved by the FCC and state commissions are, if anything, too short.

141. The Commission has also asked for comment on the appropriate depreciation rate—in particular, whether an anticipated decline in asset prices warrants front-loading depreciation recovery rather than straight-line depreciation. *Notice* ¶¶ 102-08. In theory, economic depreciation rates are front-loaded when prices or volumes are declining, and back-loaded when prices or volumes are increasing. As a practical matter, however, departing in either direction from straight-line depreciation methods may be unwarranted for local telephone assets. First, the adoption of regulatory depreciation lives that are shorter than the actually expected asset lives produces a front-loading of capital recovery that resembles the effect of accelerated depreciation. As Mr. Lee and Mr. Klick explain, currently used regulatory asset lives are generally much shorter that the asset lives actually projected. Second, I understand that traditional straight-line depreciation generally has been replaced with equal-life group depreciation. As explained by Mr. Lee, the equal-life group method produces annual depreciation and net plant curves that are more front-end loaded than straight-line depreciation. To front-end load depreciation recovery still further by explicit adoption of an accelerated depreciation method could lead to significant overrecovery.

142. Nor is a further acceleration of depreciation recovery warranted by the supposed "tension" between "levelizing prices, on the one hand, and establishing UNE prices that reflect anticipated equipment price changes, on the other hand" (*Notice* ¶ 92). Levelized recovery of capital costs is in fact sustainable. Indeed, a particular form of levelization—a constant real annuity covering both depreciation, the cost of capital and taxes—is the only time pattern of recovery that is sustainable over time in stationary contestable markets. To the extent that the

economic depreciation of an asset is front-end loaded because the price of the asset is falling, the present value of the stream of depreciation payments should be held equal to the acquisition cost of the asset.

143. A recent Commission staff working paper by David M. Mandy and William W. Sharkey does not warrant a contrary conclusion. In their paper, Drs. Mandy and Sharkey show that levelization of depreciation expenses can cause underrecovery or overrecovery of total investment if the following three conditions are present: (1) depreciation charges are based solely on projected asset lives, without adjustment for changes in asset prices, (2) depreciation charges are levelized over the life of the assets, and (3) UNE prices are reset in rate cases at intervals shorter than the asset lives. To correct for this supposed problem, Mandy and Sharkey propose the use of upward correction factors for assets with falling prices, and downward correction factors for assets with rising prices.

144. While Mandy and Sharkey's conclusions follow from their assumptions, their assumptions are at odds with how TELRIC is actually applied. As noted above, the regulatory asset lives used in UNE rate cases appear to be considerably shorter than the service lives actually projected for local network assets. Hence, existing depreciation lives already provide the same kind of additive or multiplier that Mandy and Sharkey advocate, and applying their adjustment to existing depreciation lives would accordingly produce a cost overrecovery.

G. Deaveraging UNE Rates.

145. As noted, competitive entry into local telephone markets is critically dependent on ensuring that competitors' costs – *i.e.,* the UNE rates charged by the incumbents – mirror the incumbents' forward-looking economic costs of providing local telephone service. Accordingly,

the Commission should continue to require states to implement geographic deaveraging of UNE rates. *Notice* ¶¶ 133-137.

146. The Commission also seeks comment on whether geographic deaveraging of UNE rates is appropriate in areas where states have not implemented retail rate deaveraging. Again, the answer is yes. Whether or not a state has implemented retail rate deaveraging has no impact whatsoever on the economics of geographic UNE rate deaveraging. The relevant economic issue is whether competitors' *costs* mirror those of the incumbent. If the incumbent enjoys a cost advantage in any geographic area, then it will not be economically viable for competitors to enter that area, regardless of whether retail rates are deaveraged. The incumbent always will be able to charge a lower retail price to the end-user as a result of the incumbent's lower costs, regardless of the retail rate structure adopted by state commissions.

147. Incumbents have in the past criticized geographic deaveraging of UNE rates on the grounds that such deaveraging undermines state subsidy mechanisms. Incumbents have argued that some states permit incumbents to charge higher rates in urban areas, in order to subsidize lower rates in higher-cost rural areas. According to these incumbents, geographic UNE rate deaveraging permits competitors to enter only in the urban areas, and to charge lower rates than the incumbents, which in turn requires the incumbents to respond by charging rates in urban areas that match those of the competitors. This reduction in urban revenues for the LEC undermines the LEC's ability to use urban revenues to cross-subsidize lower retail rates in rural areas.

148. This argument should not govern policy. States should not be permitted to block competitive local telephone entry on the basis of a state policy of maintaining uneconomic implicit rate subsidies. There are far less anticompetitive and economically inefficient methods

to subsidize rural rates. As one example, states could adopt *explicit* subsidies, whereby states collect funds from carriers serving urban customers, and use those funds to subsidize the provision of rural services. In fact, with the continuing requirement that states implement deaveraged UNE rates, competitive entry ultimately would force states to abandon their uneconomic implicit subsidy mechanisms and adopt more efficient and pro-competitive explicit subsidy mechanisms, a result that is, for the reasons explained above, competition-enhancing.

H. Interconnection & Reciprocal Compensation Rates Should Be Based On The Same Long-Run Incremental Cost Methodology Used To Compute UNE Rates.

149. For the same reasons that UNE prices should be based on forward-looking LRIC, it is important that the rates incumbents charge to other carriers for interconnection and reciprocal compensation mirror the incumbent's forward-looking economic costs of those services. Competitors seeking to deploy their own local or long-distance telephone services *must* connect their networks to the incumbent's networks, because the incumbents own the bottleneck loop facilities required to provide telephone service to or from every subscriber to local telephone service. If incumbents are permitted to charge more for interconnection and reciprocal compensation than their forward-looking LRIC cost of providing such services, then competition with the incumbents would not be economically viable. It would be strange indeed if the Commission imposed one standard for intrastate rates, and another standard for interstate rates.

I. Rate Changes Over Time.

150. The Commission asks whether there is a valid mechanism that could be used to adjust UNE prices over time, thereby reducing the need for state commissions to conduct a full UNE pricing proceeding every few years. Although such automatic adjustments are a good idea

in theory, they would be very difficult to implement, and likely would result in more harm than good.

151. First, an adjustment factor that understates the appropriate periodic reduction in UNE rates (or overstates such increases in UNE rates) could result in UNE rates that seriously undermine competitors' ability to compete against incumbents. Competitors would then face UNE prices that exceed the incumbent's costs, providing the incumbent with a substantial cost advantage compared to the competitors. Such cost advantages obviously act as a substantial barrier to competitive entry. On the other hand, an adjustment factor that overstates the appropriate periodic reduction in UNE rates (or understates such increases in UNE rates) would place the incumbents at a substantial competitive advantage. Moreover, the LECs have repeatedly claimed that failing to compensate them fully for the provision of UNEs would be an unlawful "taking." Thus, UNE cost factors should be implemented only if they can be accurately computed.

152. Computing UNE cost adjustment factors would be an extremely complex task, and likely would result in significant error, resulting in such substantial competitive harms. As explained below, a separate cost factor would have to be computed for each UNE, in each state. And the cost factors necessarily would depend on forecasts of myriad variables that are, by their nature, very difficult to forecast accurately. Indeed, the results of the Commission's interstate access price cap mechanism confirms that there is a large degree of error in computing even productivity and inflation factors.

153. *UNE Cost Adjustment Must Be UNE Specific.* There is no question that a separate UNE adjustment factor would have to be computed for each UNE, because the cost of each UNE depends on changes in different economic circumstances. *Cf. Notice* ¶ 139. For example, loop

costs are critically dependent on the demand for loops, whereas switching costs depend on the number of ports *and* may depend on the number of minutes of use of the network. Accordingly, a loop cost factor would reflect expectations about future line demand, whereas a switch cost factor would have to reflect expectations about future minutes of use of the network. Moreover, even the basic productivity and inflation factors would differ for loops and switches. Recent history shows that the cost of switching equipment has declined sharply, while the productivity of switches has increased precipitously. By contrast, the prices for copper loops, for example, have remained relatively constant, and the productivity of copper loops has increased at a far slower pace. The need to create a different cost factor for each UNE significantly complicates the process and increases the potential for substantial error.

154. A single UNE adjustment factor would thus, by definition, over- or under-state the actual cost changes for both loops and the switching. A single UNE adjustment factor, therefore, would, for the reasons noted above, substantially distort competition and undermine the core purpose of the 1996 Act. As a result, it is clear that a separate UNE adjustment factor would have to be adopted for each UNE.

155. *UNE Cost Adjustment Factors Would Need To Be State Specific.* UNE cost adjustment factors also would have to be state specific. *Cf. Notice* ¶¶ 139-140. This much is beyond legitimate dispute. UNE costs, and changes in UNE costs, clearly vary from state to state, as evidenced by the widely disparate UNE rates adopted by each state, and the widely disparate changes in UNE rates adopted by each state. Moreover, states have adopted different rate structures, *e.g.,* some states have a flat, per line switching rate, whereas others have a usage-sensitive switching rate. A UNE cost adjustment must therefore be custom tailored to each state's adopted UNE rate structures.

156. *UNE Cost Adjustment Factors Would Need To Be Based On Several Variables.* Any legitimate UNE cost adjustment factors would have to reflect more than just productivity and inflation. *Cf. Notice* ¶ 139. As noted, for example, UNE costs also are critically dependent on network demand. A large portion of UNE costs reflect costs that are common to all UNEs and that are allocated based on the number of customers or the by the number of minutes that customers use the telephone networks. Growth in demand, therefore, results in lower per line or per minute costs because the fixed costs are spread over more lines or more minutes. Accordingly, UNE cost factors would at least have to account for such demand changes.

157. *Computing Accurate UNE Cost Adjustment Factors Would Be Very Difficult.* As noted, it is imperative that any UNE cost adjustment factors be highly accurate, for any significant errors would result in over- or understated UNE rates which would distort competition. The evidence suggests, however, that such factors could not be computed with the necessary degree of accuracy. For example, as discussed above, UNE cost adjustments must account for changes in network demand. But network demand has fluctuated wildly in recent years as a result of technology shocks to the economy. In the mid-1990s, as "dial-up" Internet access became popular, there was substantial unexpected growth in demand for lines, because residential customers began to purchase second lines to access the Internet. More recently, however, as broadband has become more widely available residential customers have begun to cancel those second lines. Residential customers also have recently begun to substantially substitute wireline services for wireless services. As this example illustrates, repeated unexpected shocks to the sector as well as to the economy have a substantial impact UNE pricing, and, by definition it is impossible to accurately predict such shocks.

158. The Commission's interstate access price cap regime illustrates this point. Indeed, based on the Commission's experience with the interstate access price cap regime, it appears that even productivity and inflation factors could not accurately be estimated for each state. The existing interstate price cap mechanism includes automatic adjustments that are supposed to account for inflation and increases in the incumbents' productivity. However, since the Commission adopted the price cap mechanism in 1990, the Commission already has twice been required to "reinitialize" the entire system because the automatic adjustment factors inaccurately predicted inflation and productivity.[23] And even after those reinitializations, it is clear that the productivity and inflation factors continue to be inaccurate. Indeed, even with these adjustments, the incumbents are earning record returns on their interstate access rates, indicating that the current productivity factors have substantially underestimated the incumbents actual productivity gains. Whereas incumbents earned approximately a 11.25 percent on interstate access services prior to the implementation of price caps, I understand that incumbents today are earning returns that are as much as 50 percent.[24] Based on the failure of the interstate access price cap regime, it appears that a similar regime applied to UNE rates would be fatal to competition.

159. On this record, it is indicated that it would be implausible to estimate with sufficient accuracy the state- and UNE-specific cost adjustment factors necessary to obviate periodic UNE cost proceedings. The potential for error is sufficiently high that an attempt to implement such a regime almost certainly would result in over- or under-estimates of UNE rates

[23] Petition of AT&T Corp., AT&T Corp., *Petition for Rulemaking To Reform Regulation Of Incumbent Local Exchange Carrier Rates For Interstate Special Access Services,* RM No. 10593 (filed Oct. 15, 2002).

[24] *Id.*

and thus, would substantially distort competition. Moreover, it is not clear that the costs of state proceedings to establish such factors – which presumably would have to be done every few years – would be substantially lower than those of traditional cost proceedings. And the harms to competition of the almost certain inaccuracies in such factors likely would outweigh any savings associated with conducting a somewhat fewer cost proceedings.

VERIFICATION PAGE

I declare under penalty of perjury that to the best of my knowledge the foregoing Declaration is true and correct.

/s/ Robert Willig
Robert Willig

Executed on: December 16, 2003